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SPECIAL Announcements

RELIABILITY ABSTRACTS OFFERED ON SUBSCRIPTION

Commencing in January 1965 the Clearinghouse for Federal Scientific and Technical Information will sell on subscription the National Aeronautics and Space Administration monthly publication, Reliability Abstracts and Technical Reviews. The purpose of the publication is to rapidly abstract and rigorously analyze material in the current literature on reliability. Begun by NASA in April 1961, it alerts engineers and scientists to the latest developments in the theory and practice of reliability, especially as they apply to space technology.

The development of the general field of reliability began about 30 years ago as a sort of statistical quality-control technique for mass-produced commodities. What is new in reliability is the intensive application of its concepts and procedures, notably to space equipment, which must not only be built to operate in a hostile and sometimes undefined environment, but also without the experience available from mass-production statistics. Most spacecraft and propulsion systems are few-of-a-kind.

Under contract to NASA, a team of scientists and statisticians at the Research Triangle Institute, Durham, N. C., surveys current papers on reliability and closely related subjects from all available sources. Each month they search five or six dozen journals, reports, and proceedings of conferences and transactions.

The significant feature of the abstracting is to subject the contents of the original source document to searching critical analysis, something rarely encountered in abstracting services.

Reliability Abstracts subscriptions are on a calendar year basis beginning in January. Subscribers who order later in the year will receive back-issues from January. An annual index is included in the subscription price.

The abstracts cost $15 per year starting with January 1965. The 1965 abstracts will be identified as Volume V and will be distributed monthly.

Back volumes are also available at $15 each. They are:

Volume I, April 1961 - May 1962
Volume II, June 1962 - May 1963
Volume III, June 1963 - May 1964
Volume IV, June 1964 - December 1964

Orders are being accepted now. Order from The Clearinghouse for Federal Scientific and Technical Information, U. S. Department of Commerce, Springfield, Va. 22151.

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
Donald A. Schon, *Director*

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Contents may be reprinted freely. Mention of source will be appreciated.

Use of funds for printing this publication approved by the Director of the Bureau of the Budget, June 30, 1961.

U.S. Government Research Reports

This publication is issued twice a month to announce new reports of research and development released by the Department of Defense and certain other agencies of the Federal Government sponsoring research and development programs. Unless otherwise indicated, reports listed are available from the Office of Technical Services. The documents are available in original, reproduced, or microfiche copy only.

The first section of U. S. Government Research Reports (USGRR) is prepared for the Defense Documentation Center and is called "Technical Abstract Bulletin" (TAB). (DDC is a Department of Defense agency which services DOD agencies and their contractors with military research information.) The next section is called "Non-Military and Older Military Research Reports." Here are listed new reports of civilian agencies of the Government and military research reports not to be found in the "TAB." Most of these older military reports have been acquired by OTS in response to specific industry requests.

Atomic Energy Commission reports available from OTS are listed in Nuclear Science Abstracts. NSA is available to the general public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at $30 a year (domestic), $37 a year (foreign). Single copy cost, $1.75 (plus 25 percent for foreign mailing).

National Aeronautics and Space Administration reports available from OTS are listed in Scientific and Technical Aerospace Reports. STAR is available to the general public on subscription from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at $25 a year (domestic), $31 a year (foreign). Single copy, $1.50 (plus 25 cents for foreign mailing).

How To Order Reports

Almost all reports listed in USGRR are available from the Office of Technical Services, U. S. Department of Commerce, Washington, D. C., 20230, or may be ordered through any Department of Commerce Field Office. Prices are given with each entry. Hard copy price is indicated by the letters "HC"; microfiche price is indicated by the letters "MF." Please use the identification numbers (AD number, PB number) and titles of reports when ordering. Also use accession numbers when ordering documents listed in NSA and STAR. Prepayment is required or purchases can be charged to Superintendent of Documents deposit accounts.

For reports available from GPO only, address your order and make check or money order payable to Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 20402.

When any report is available from a source other than OTS or GPO, the name and address of that source will be given. Direct your order to that address and not to OTS.

NOTICE TO SUBSCRIBERS

Retroactive Pricing Rescinded

The new Standard Pricing Schedule announced in the August 20, 1964, issue of this publication is intended to eliminate dual pricing, and to provide a uniform, stable basis for the purchase of reports -- with an overall price reduction of about one-third. The retroactive feature of the announcement, however, has resulted in delays, excessive correspondence, and confusion in filing orders for reports. Therefore, in the interest of improving service, retroactive pricing is being cancelled. Accordingly, the earlier announcement is revised as follows:

1. All reports available through the Clearinghouse will be sold at the individual prices announced in U. S. Government Research Reports since July 1, 1961.
2. Reports announced in issues prior to July 1, 1961, will continue to be available at a cost of photo-reproduction from the Library of Congress, Photoduplication Service Section.

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OTS has changed its system of microphotography from microfilm to microfiche (a unitized sheet form of microphotography). All documents announced by OTS subsequent to July 15, 1964, are available either in original, reproduced, or microfiche copy only.

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Method of Purchase	Microfiche Price
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Automatic Distribution of all reports or all translations available from Clearinghouse in microfiche	$ .25 for 1st sheet plus .25 for each trailer sheet
Additional copies of the same document requested with the original order	$ .25 for 1st sheet plus .25 for each trailer sheet

*Automatic distribution by subject category, through advance subscription, will be announced in the near future.

Pricing schedules for sale of magnetic (computer) tapes, new journals, catalog cards, fee literature searches, and other bibliographic materials will be announced later.

HOT MACHINING SUBJECT OF FIRST STUDY IN NEW PROGRAM

A review and evaluation of Government research reports on Hot Machining of metals has been published by the Clearinghouse for Federal Scientific and Technical Information, U. S. Department of Commerce.

This is the first in a series of "package studies" planned by the Institute for Applied Technology, National Bureau of Standards, of which The Clearinghouse is now a part.

Based upon suggestions from industry, state industrial development groups and similar sources, specific subjects in high industrial interest areas are selected for coverage in these studies.

A team of NBS technologists reviews the pertinent Federal R&D reports acquired by The Clearinghouse over the past several years from agencies such as the Department of Defense, Atomic Energy Commission, National Aeronautics and Space Administration. These technologists select the most significant material, review and summarize it, indicating industrial applicability.

The package, or summary of 5-10 pages, includes a bibliography containing abstracts, prices, and sources of documents reviewed. There is also a bibliography of older, but relevant, reports. Usually, reports listed in both bibliographies will be available from The Clearinghouse at the cost of reproduction and handling.

The Hot Machining study covers the period since 1960. It concludes that hot machining, using a choice of several methods of heating the workpiece to temperatures up to 1000°F, offers easier and cheaper turning and milling of many metals and alloys. The greatest improvements possible in tool life, cutting speeds, and costs are for hardened low alloy and tool steels. Significant improvements are possible on stainless steels, nickel and cobalt base alloys. Methods tested in the research reviewed have not produced improvements in drilling of steels or superalloys, or in turning or milling of titanium and refractory metals.

The first package, HOT MACHINING, A Means of Lower Cost Turning and Milling of Hard Steels and Superalloys, may be purchased from The Clearinghouse, U. S. Department of Commerce, Springfield, Va. 22151 by ordering OTR-101, price 50 cents. Other subjects soon to be published are:

Fire-Extinguishing Material Technology
Grease Lubrication
Photochromic Materials
Nickel-Titanium Alloys
Flame Resistant Textiles

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FEDERAL REGIONAL TECHNICAL REPORT CENTERS

Each of the Federal Regional Technical Report Centers listed below contains a collection of USAEC, NASA, and DOD unclassified reports as well as reports of other U. S. government agencies and provides reference, interlibrary loan, and reproduction services.

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General Library
Berkeley, Calif. 94704

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University Library
Los Angeles, Calif. 90024

Library of Congress
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Washington, D. C. 20540

Georgia Institute of Technology
Price Gilbert Library
Atlanta, Ga. 30300

The John Crerar Library
35 West 33rd St.
Chicago, Ill. 60616

Massachusetts Institute of Technology
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Engineering Library
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4400 Forbes St.
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Science Library
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Dallas, Tex. 75222

University of Colorado
Boulder, Colo. 80301

University of Washington Library
Government Documents Center
Seattle, Wash. 98105

CUMULATIVE INDEXES

The following Cumulative Indexes for U. S. Government Research Reports are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., 20402:

Volume 38	Annual Cumulative Index January - December 1963 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
	Cumulated Index May - December 1963 Includes Technical Abstract Bulletin only.	$3.50
	Collective Index 1 January - 1 May 1963 Includes Technical Abstract Bulletin only.	$3.50
Volume 37	Annual Cumulative Index January - December 1962 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
	Semi-annual Cumulative Index July - December 1962 Includes Technical Abstract Bulletin only.	$3.50
	Semi-annual Cumulative Index January - June 1962 Includes both Technical Abstract Bulletin (TAB) and "Non-Military and Older Military Reports" sections.	$3.50
Volume 36	July - December 1961	$3.50
Volume 35	January - June 1961	$1.00
Volume 34	July - December 1960	$1.00
Volume 33	January - June 1960	$1.00
Volume 32	July - December 1959	$1.00

For information regarding the availability of earlier indexes write to Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

TECHNICAL ABSTRACT BULLETIN

1. Aircraft and Flight Equipment

AD-606 887 Div. 1
OTS Prices: HC $3.00/MF $0.75

Aviation Safety Engineering and Research, Phoenix, Ariz.
PERSONNEL RESTRAINT SYSTEM STUDY CV-2 DeHAVILLAND CARIBOU.
Crash injury evaluation.
Apr 64, 74p AvCIR-62-16 Suppl.
Contract DA44 177AMC888T, Proj. 1A024701A12101
TRECOM TR64 3 suppl.

Unclassified report

See also AD-606 893.

Descriptors: (*Safety harness, Design), (*Aircraft seats, Design), Aviation safety, Short take-off planes, Aviation injuries, Aviation personnel, Aircraft equipment.

AD-606 893 Div. 1
OTS Prices: HC $3.00/MF $0.75

Aviation Safety Engineering and Research, Phoenix, Ariz.
PERSONNEL RESTRAINT SYSTEM STUDY, CV-2 DeHAVILLAND CARIBOU.
Crash injury evaluation,
by Joseph L. Haley, Jr. and James P. Avery. Apr 64, 76p AvCIR-62-16
Contract DA44 177AMC888T Proj. 1A024701A12101
TRECOM TR64 3

Unclassified report

Descriptors: (*Safety harness, Design), (*Aircraft seats, Aviation safety), Short take-off planes, Aviation injuries, Aviation personnel, Aircraft equipment.

The report presents detailed suggestions for the improvement of the personnel restraint system in the U. S. Army CV-2 aircraft. The suggestions pertain primarily to strengthening existing restraint system components rather than to a basic change of the system. The modifications presented indicate an increased strength of the crew seats from 20-25G to 35-40G, and of the lap-belt anchorages for the troop seats from 12-15G to 22-28G. (Author)

AD-606 908 Div. 1
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
GENERAL DESCRIPTION OF A COOPERATIVE ANTI-COLLISION SYSTEM FOR AIRCRAFT,
by L. B. Early. 8 Feb 58, 6p P-1353

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aviation accidents, Reduction), (*Aircraft, Aviation safety), Radio receivers, Radio transmitters, Antennas, Direction finding, Ranges (Distance), Antenna radiation patterns, Doppler effect.

A system, which requires no advance in the state of the art of communication techniques, for the prevention of aircraft mid-air collisions is presented. This cooperative system utilizes radio transmitters and receivers in the aircraft and presents the following information to each aircraft: presence of another aircraft; relative position, bearing, and elevation of the aircraft; closing and opening rate; and, course of the other aircraft.

AD-607 036 Div. 1
OTS Prices: HC $4.00/MF $1.00

Cook Electric Co., Morton Grove, Ill.
STUDY OF PARACHUTE PERFORMANCE AND DESIGN PARAMETERS FOR HIGH DYNAMIC PRESSURE OPERATION.
Rept. for 1 Jul 62-31 Dec 63,
by P. E. Pedersen. May 64, 141p
Contract AF33 657 9182, Proj. 6065, Task 606505
FDL TDR64 66

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Parachutes, Performance (Engineering), Design, Aerodynamic loading, Aerodynamic characteristics, Rocket propelled sleds, Tests, Shock (Mechanics), Drag, Stability, Temperature, Deceleration.

Parachute design and performance data were obtained on a series of 24 rocket-powered sled tests. Parachute deployment velocities, ranging between Mach 1.0 and 1.5, were obtained with the Tomahawk parachute test sled operating in either single stage or double stage, pusher configuration. Parachute types that were investigated included Hyperflo, Hemisflo, Reefed Conical Ribbon and Supersonic Guide Surface designs. The data obtained included inflation characteristics, opening shock factors, drag coefficients, inflated areas, stability, canopy temperatures and general structural and aerodynamic design considerations. From this parachute decelerator test program, it may be concluded that the Hyperflo type parachute, both mesh and ribbon roof designs, and the Hemisflo type parachute can be fabricated to withstand and operate successfully in the high dynamic pressure region of 3000 psf. Supersonic reefed operation and disreef to full open was also demonstrated as practical with a Conical Ribbon type parachute design. The test vehicle system including associated deployment and release techniques and the data acquisition system are also discussed. (Author)

AD-607 112 Div. 1, 12
OTS Prices: HC $5.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ROOT LOCUS ANALYSIS OF A HIGH-GAIN-LINEAR SYSTEM WITH VARIABLE COEFFICIENTS.
Master's thesis,
by Robert H. LaBounty. 26 Aug 64, 164p
AFIT GSF/EE/64 1

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

original test conditions were run on the article until a catastrophic failure occurred. Based on the fatigue spectrum utilized, the F104G/MAP aircraft has a satisfactory fatigue life. (Author)

AD-607 221 Div. 1
OTS Prices: HC $1.00/MF $0.50

Institute for the Study of Fatigue and Reliability, Columbia Univ., N.Y.
DEVELOPMENT OF RANDOMIZED LOAD SEQUENCES WITH TRANSITION PROBABILITIES BASED ON A MARKOV PROCESS.
Technical rept. no. 4,
by R. A. Heller and M. Shinozuka. Jun 64, 24p
Contract Nonr266 91, Proj. NR064 470

Unclassified report

Descriptors: (*Fatigue (Mechanics), Aircraft equipment), (*Loading (Mechanics), Stochastic processes), (*Mathematical models, Probability), Series, Sequences, Statistical processes, Operations research, Control sequences, Test methods.

Because of the controversial nature of the reliability of cumulative damage rules, fatigue life estimates of aircraft structures and components, subjected to variable amplitude service loads, are presently based on programmed fatigue tests. The most frequently utilized load sequences--up, down, up-and-down, and randomized steps--are either unrealistic or difficult to apply in testing machines. A time series combining the advantages of both randomized and programmed sequences while avoiding the disadvantages of both was presented based on the mathematical model of a Markov chain. (Author)

AD-607 246 Div. 1, 19, 30
OTS Prices: HC $2.00/MF $0.50

Federal Aviation Agency, Washington, D. C.
PRESSURE MEASUREMENT FOR PRESSURE ALTIMETRY.
Technical rept.,
by William M. Russell. Aug 64, 42p
Proj. 320 205 02N
FAA RD64 119

Unclassified report

Descriptors: (*Altimeters, Calibration), Test methods, Barometers, Barometric pressure, Standards, Navigation, Airport control towers, Airtraffic control systems, Automatic, Weather stations, Construction, Installation, Maintenance, Operation.

The report recommends equipment and maintenance standards for use in pressure altimetry. It covers both measuring pressure for calibrating altimeters and measuring pressure to determine altimeter setting. Specifications for advanced automatic equipment are included. Implementation of the recommended standards should reduce calibration errors to acceptable limits. (Author)

AD-607 249 Div. 1, 32
OTS Prices: HC $6.00/MF $1.25

Aviation Safety Engineering and Research, Phoenix, Ariz.
SYNTHESIS OF AIRCRAFT (CRASH) FIRE, RESCUE, AND EVACUATION TECHNOLOGY.
Technical rept.,
by H. G. C. Henneberger, H. F. Roegner, and L. Cambeis. Jul 64, 258p
Contract FA WA4458
FAA ADS16

Unclassified report

Rept. on Proj. SAFRET.

Descriptors: (*Aircraft fires, Bibliography), (*Aviation safety, Bibliography), Rescues, Hazards, Fire safety, Aviation fuels, Fire-resistant textiles, Aviation accidents, Fire extinguishers, Human engineering, Reports, Documentation; Abstracting, Subject indexing, Classification, Information retrieval.

Contained in the report are all of the basic elements the user needs to rapidly identify documents containing specific information on the subject of postcrash aircraft fire, rescue and evacuation. After pertinent documents have been identified the user is able to read an abstract of each. The information retrieval system is simply described from the user's point of view. (Author)

AD-607 250 Div. 1
OTS Prices: HC $4.00/MF $1.00

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF THE CLOSED-CIRCUIT-TELEVISION PILOT WEATHER-BRIEFING FACILITY AT LAMBERT FIELD, ST. LOUIS, MISSOURI.
Final rept.,
by Edward F. Kups. Mar 64, 148p
Proj. 205 002 01V
FAA RD64 44

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Television display systems, All-weather aviation), (*All-weather aviation, Television display systems), (*Weather forecasting, Terminal flight facilities), (*Terminal flight facilities, Weather forecasting), Airports, Missouri, Television equipment, Feasibility studies, Aeronautics.

Two closed-circuit-television systems were evaluated for legibility of display, freedom from interference, accuracy of the displayed information, reliability, and man-machine compatibility. The ability of the briefer to convey clear and complete weather information when using the television method as compared to using the telephone briefing method was investigated. It was concluded that the conveyance of complex weather situations verbally, using the telephone method without the ability to display weather-charts to the pilot, hampers the briefer in the portrayal of weather situations, and limits the pilot's ability to assimilate the weather conditions discussed. It was further concluded that the method of utilizing a closed-circuit-television system for pilot weather-briefing provides the pilot with essentially the same weather-chart data and weather information, at a remote location, that he would receive had he appeared in person at the Flight Service Station and that the method is a considerable advance over the standard telephone weather-briefing method. Pilots readily accepted the new concept and considered the closed-circuit-television type of weather briefing as excellent, and preferred this service over the standard telephone briefing previously available. (Author)

AD-607 283 Div. 1, 15, 30
OTS Prices: HC $6.00/MF $1.50

Planning Research Corp., Los Angeles, Calif.
TECHNIQUES FOR PREDICTING R AND D COSTS

Descriptors: (*Linear systems, Flight control systems), (*Adaptive control systems, Flight control systems), (*Locus, Graphics), Design, Analysis, Gain, Dynamics, Feedback, Control, Sensitivity, Control systems, Re-entry vehicles, Boost-glide vehicles, Wings, Rocket planes.

The purpose of this thesis was to develop a method of successfully applying the root locus technique to a high-gain-linear system with variable coefficients. The problem was solved by establishing rules for positioning the far out poles of such a system based on data obtained from the analysis of a high-gain system unsuccessfully designed for the X-15 aircraft. The new method was applied successfully to two different systems. The conclusion and result was that a highly insensitive high-gain system capable of handling large variations in the static loop sensitivity can be successfully designed. (Author)

AD-607 124 Div. 1
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STABILITY OF MOTION OF AN AIRCRAFT, CONTROLLED BY AN AUTOPILOT OVER THE TAKE-OFF-LANDING STRIP,
by L. G. Lobas. 23 Sep 64, 16p
FTD TT64 566; TT 64 71528

Unclassified report

Unedited rough draft trans. of Prykladna Mekhanika (USSR) 1963, v. 9, no. 6, p. 659-669.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aircraft, Motion), Stability, Automatic pilots, Take-off, Landing fields, Aerodynamic characteristics, Equations.

AD-607 128 Div. 1, 32
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DEGREES OF TALENT,
by M. Lebedinskii. 19 Sep 64, 9p
FTD TT64 342; TT 64 71524

Unclassified report

Unedited rough draft trans. of Kryl'ya Rodiny (USSR) 1963, v. 14, no. 12, p. 14-15.

Descriptors: (*Scientific personnel, Aeronautics), (*Commercial planes, USSR), (*Gliders, Design), Aircraft, Airplanes.

AD-607 130 Div. 1
OTS Prices: HC $1.00/MF $0.50

Systems Engineering Group, Research and Technology Div., Wright-Patterson AFB, Ohio.
A STUDY ON IMPROVING ELECTRONIC CONTROL OF AIRCRAFT POP-UP ARRESTING SYSTEMS.
Rept. for Jul-Oct 63,
by Paul L. Kittinger. Aug 64, 25p
SEG TDR64 38

Unclassified report

Descriptors: (*Aircraft, Arresting gear), (*Arresting gear, Control systems), Electronic equipment, Runways, Circuits, Cables (Mechanical), Feasibility studies, Landing aids, Take-off.

A study was made to determine if a more satisfactory and universal aircraft arresting system could be obtained at a cost equal to or less than the present pop-up arresting system. Primarily, the study was to examine the present electronic control circuitry and determine the modifications and/or developments necessary to provide increased control of and utilization for many aircraft. Requirements of the arresting system control circuitry were to determine the particular aircraft weight class, velocity, and direction of travel along the runway. Logic networks were to be used for these purposes. The pop-up arresting cable would be ejected at the time determined by the control circuitry to engage an arresting hook located on the aircraft behind the main landing gear. Various aircraft were studied, graphical data was constructed, and basic logic networks were utilized. It was concluded that due to the complex information desired and the limits imposed, the resulting system would not meet the desired requirements. However, by intelligent reexamination of the problem, a feasible system can result assuming that some requirements and limitations are removed. (Author)

AD-607 155 Div. 1
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CURRENT ASPECTS OF THE THEORY OF STABILITY AND CONTROL OF AIRCRAFT,
by T. Khaker. 18 Sep 64, 44p
FTD TT64 396; TT 64 71543

Unclassified report

Unedited rough draft trans. of Revue de Mecanique Appliquee (Rumania) 1963, v. 8, no. 2, p. 193-216.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aircraft, Stability), (*Automatic pilots, Control), Flight, Motion, Simulation, Computers, Aerodynamic characteristics, Mathematical models, Rumania.

AD-607 208 Div. 1
OTS Prices: HC $2.00/MF $0.50

Air Force Flight Dynamics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
FATIGUE TEST PROGRAM F-104G/MAP AIRCRAFT,
by Frank D. Boensch. Aug 64, 32p
Proj. 040A 77037
FDL TDR64 97

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Airframes, Fatigue (Mechanics)), (*Fatigue (Mechanics), Airframes), Loading (Mechanics), Life expectancy, Tests, Aerodynamic loading, Gust loads, Jet fighters, Test methods.

The Lockheed California Company F104G/MAP airframe was subjected to a full scale fatigue test. The test spectrum consisted of five symmetrical test loadings and one lateral gust loading. The repeated application of these loadings simulated 16,000 hours of service life. At the conclusions of the original test spectrum, a modified spectrum was applied for one additional test lifetime (4000 hours) finally 100 percent limit load cycles of the

2. Astronomy, Geophysics and Geography

AD-606 874 Div. 2
OTS Prices: HC $3.00/MF $0.75

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
STUDY OF ATMOSPHERIC ELECTRIC TRACING OF HIGH-ALTITUDE IRREGULARITIES.
Final rept.,
by H. Dolezalek. 5 Oct 64, 84p RAD-TR-64-30
Contract AF19 628 3289, Proj. 8653, Task 86535
AFCRL 64 678
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Atmospheric electricity, Measurement), (*Aurorae, Atmospheric electricity), (*Ionospheric disturbances, Atmospheric electricity), Airborne, Meteorological instruments, Electric fields, Atmosphere, Correlation techniques.

Atmospheric electric parameters measured at the ground or in the troposphere are frequently observed to be correlated with aurorae or other cosmic or ionospheric events. Such correlations cannot be explained on the basis of our present knowledge of atmospheric electricity and auroral physics. Several qualitative hypotheses are presented in this document. A new experimental approach is proposed which utilizes a high-flying aircraft suitably equipped with ionospheric instrumentation. The aircraft would tow a float containing atmospheric electric equipment. A general survey of measuring methods for small electric fields in the stratosphere is included in the report. (Author)

AD-606 899 Div. 2, 30
OTS Prices: HC $1.00/MF $0.50

Travelers Research Center, Inc., Hartford, Conn.
WEATHER DATA PROCESSING RESEARCH AND DEVELOPMENT PROGRAM.
Monthly progress rept.,
by Glyndon L. Lynde. Sep 64, 18p
Contract Cwb10704, Proj. 7411, 7414
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-601 771.

Descriptors: (*Weather forecasting, Data processing systems), (*Data processing systems, Weather forecasting), (*Programming (Computers), Weather forecasting), Meteorological parameters, Mathematical prediction.

Contents:
Medium-period terminal forecasting project; Enroute weather-analysis and prediction project; Implementation testing of meteorological processing techniques; Digifax programming project; Subsynoptic scale processes project; Approach zone weather studies project.

AD-607 004 Div. 2, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ISOBARS AND ANTIPODES,
by J. W. T. Youngs. 5 Aug 58, 7p P-1451
Unclassified report

Descriptors: (*Meteorological charts, Topology), (*Topology, Meteorological charts), Climatology, Barometric pressure, Theorems, Algebraic topology.

On any typical weather map of the world some isobars are small in size while others appear quite extensive. Around a low or a high pressure area the isobars usually appear as small closed curves, while between low and high pressure areas some isobars appear to be very long. This paper shows that some isobars must be long enough to contain an antipodal pair of points. The proof is deceptively short and simple, a condition brought about by the use of some of the most powerful tools in topology. (Author)

AD-607 056 Div. 2, 4, 25
OTS Prices: HC $1.00/MF $0.50

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
STUDIES OF METASTABLE ATOMS AND MOLECULES USING BEAM TECHNIQUES.
Final rept.,
by Nathaniel P. Carleton. Aug 64, 20p
Contract AF19 628 2949, Proj. 7661, Task 766104
AFCRL 64 698
Unclassified report

Descriptors: (*Upper atmosphere, Atomic properties), (*Aurorae, Atomic properties), (*Sky brightness, Atomic properties), Atoms, Molecules, Atomic energy levels, Excitation, Molecular beams, Ion sources, Chlorine, Hydrochloric acid, Oxygen, Hafnium, Electron capture, Ionosphere.

The report describes work on (1) laboratory study of certain atomic collision processes of interest in upper atmosphere physics, and (2) analysis of certain phenomena of the aurora and airglow in terms of the collision process involved. The major part of the laboratory work was the study of excitation of metastable atoms and molecules by electron impact upon a thermal molecular beam, coupled with study of radiation from the molecules thus excited and from other molecules to which they may transfer energy in collision. In a separate experiment investigating the production of negative ions at heated metal surfaces (as a possible ion source for collision studies) a study was made of reactions of C12 and HC1 on a hafnium surface in the temperature range 1300K to 2200K. A similar study was made with 02. On the atmospheric side of the work, the main inquiry was on the excitation of low-lying states of atmospheric molecules by the high energy tail of the energy distribution of ambient ionospheric electrons. (Author)

AD-607 059 Div. 2, 6, 12
OTS Prices: HC $3.00/MF $0.75

Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
STUDY OF PHOTOCHEMISTRY, PHYSICAL STATE AND MOTION OF THE UPPER ATMOSPHERE.
Final rept. for 1 Aug 63-31 Jul 64,
by Howard D. Edwards. Jul 64, 72p
Contract AF19 628 3305; Grant NsG304 63, Proj. 4984, ARPA Order 42, Task 498401
AFCRL 64 700
Unclassified report

Descriptors: (*Atmospheric motion, Upper atmosphere), (*Upper atmosphere, Turbulence), (*Guided missiles, Condensation trails), Wind, Atmospheric tides, Physical prop-

AND SCHEDULES OF AUTOMATIC FLIGHT CONTROL SYSTEMS: VOLUME I, AERODYNAMIC VEHICLES.
Rept. for Sep 62-Aug 63,
by Alonzo J. Connors, H. M. Dye, R. L. Erler, R. H. Joe, and C. P. Martin. Aug 64, 271p PRC-R-378
Contract AF33 657 7202, Proj. 8219, Task 821904
RTD TDR63 4064 V1

Unclassified report

Prepared in cooperation with Systems Technology, Inc., Inglewood, Calif.

Descriptors: (*Flight control systems, Costs), (*Operations research, Flight control systems), Optimization, Systems engineering, Automatic, Aircraft, Statistical analysis, Mathematical models, Functions, Equations, Statistical data, Probability, Matrix algebra, Mathematical prediction, Theory.

The objective of this report was to investigate and formulate techniques for predicting the development cost and development time of automatic flight control systems in aerodynamically supported vehicles--both manned and unmanned. An empirical approach is taken, using relevant historical data on 25 automatic flight control systems. The predictive methodology is formulated using two types of statistical estimation models. The resultant predictive techniques are expressed as simple algebraic equations that can be evaluated to obtain cost and time estimates for a proposed flight control system. The principal elements that are necessary to evaluate the prediction equations are a group of parameters generally defined prior to, or early in, an R and D program. Examples of these parameters are gross functional and design complexity of the automatic flight control system; performance and airframe characteristics of the vehicle; and scope and calendar date of the development program.

AD-607 303 Div. 1
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INTERNATIONAL RECORD OF MARINA POPOVICH,
by Elha. 23 Sep 64, 7p
FTD TT64 971; TT 64 71565

Unclassified report

Unedited rough draft trans. of Skrzydlata Polska, 1964 v. 20 no. 30, p. 9.

Descriptors: (*Pilots, Females), (*Aviation personnel, USSR), Jet planes, Flight speeds.

Recently, the Soviet lady pilot, wife of Cosmonaut No. 4, Marina Popovich, after taking off one early morning from the Moscow airfield in a Czech-made sports aircraft L-29, achieved great success. She flew at an altitude of 500 meters, at a closed circle route of 100 km at an average speed of 600 km/hr. This is a new sports achievement on the world scale, in the class of light sports jet aircraft weighing up to three tons. So far, no one has recordedsuch a type of flight in the charts of world records.

AD-607 339 Div. 1, 14, 26
OTS Prices: HC $4.00/MF $1.00

Oklahoma Univ. Research Inst., Norman.
RESEARCH IN THE FIELD OF FIBERGLASS-REINFORCED SANDWICH STRUCTURE FOR AIRFRAME USE.
Final rept. for 10 Jun 63-29 Feb 64,
by Gene Nordby, Joseph Noyes, and W. C. Crisman.
Jul 64, 144p
Contract DA44 177AMC98T, Task 1D121401 A14203
TRECOM TR64 37

Unclassified report

Descriptors: (*Airframes, Sandwich construction), (*Laminated plastics, Glass textiles), (*Sandwich construction, Laminated plastics), Processing, Aging (Materials), Epoxy plastics, Pressure, Temperature, Tensile properties, Compressive properties, Impregnation, Analysis of variance, Honeycomb cores, Airplane panels, Adhesives.

The research covered in this report involves investigation of the effects of raw materials usage and fabrication process variables on the final strength properties of fiberglass-reinforced plastic (FRP) sandwich structure suitable for use as a primary airframe structural material. The program encompassed the two types of sandwich fabrication used industrially, the one-step process method and the method whereby pre-laminated facings are bonded to the core in a separate step. The materials chosen for study were the promising Volan A finished 181 fiberglass fabric and EPON 828 epoxy resin activated by curing agent Z. Thin, 3-ply facings of these materials used in conjunction with honeycomb cores were the basic elements of the structural sandwich. The results of the research program include the isolation of the optimum conditions of fabrication; the expected strength values for these optimum fabrication conditions; the best lay-up method; and the performance of several adhesive system-core material combinations with optimum conditions of cure for each. Among the many by-products of the research effort is a multi-ply coating machine which is capable of impregnating several layers of fabric simultaneously.

AD-607 344 Div. 1
OTS Prices: HC $4.00/MF $0.75

Bell Helicopter Co., Fort Worth, Tex.
HIGH-PERFORMANCE HELICOPTER PROGRAM: PHASE II.
Summary rept.
by J. F. Van Wyckhouse and W. L. Cresap. Oct 64, 122p D-533-099-010
Contract DA44 177TC711, Proj. 9R38 13 014 01, Task 1D121401A14301
TRECOM TR64 61

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Helicopters, Design), (*Helicopter rotors, Aerodynamic configurations), Wings, Jet engines, Flight testing, Flight speeds, Hovering, Level flight, Thrust, Vibration, Tail helicopter rotors, Aerodynamic characteristics.

The results of a flight research program to investigate high-speed loaded and unloaded rotors are presented. The program is an extension of the high-performance UH-1B flight research program reported in TREC 63-42. The compound flight research helicopter, instrumentation, and test program are described and the test results are discussed. Major modifications to the basic high-performance helicopter involved the addition of two continental J69-T9 jet engines, a controllable incidence wing and controls and elevator-horizontal stabilizer changes. (Author)

AD-607 137 Div. 2, 12, 24, 25, 30
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
STAR-FIELD PHOTOGRAPHY AND LASER RANGING TECHNIQUES FOR SATELLITE-BASED GEODETIC MEASUREMENTS,
by E. B. Mayfield and E. H. Rogers. 15 Sep 64, 38p TDR-269(4710-63)1
Contract AF04 695 269
SSD TDR64 145

Unclassified report

Descriptors: (*Astronomical geodesics, Instrumentation), (*Satellites (Artificial), Geodesics), (*Geodesics, Satellites (Artificial)), Airborne, Lasers, Astronomical cameras, Stars, Photographic techniques, Mapping, Surveying, Position finding.

A method is described for obtaining cartographic and geodetic data from a manned orbital satellite. The techniques utilized are a boresight camera, which simultaneously photographs a particular point on the ground and the coaxial star field, and a laser for obtaining slant range. These, together with an accurate spacecraft ephemeris, will obtain data on angle coordinates and elevation of particular points along the orbital trace of the spacecraft with respect to a primary control station. Particular instrumental requirements are given for the star-field camera and the laser ranging device. (Author)

AD-607 140 Div. 2, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EXPLOSIONS ON THE SUN,
by V. Krat. 21 Sep 64, 8p
FTD TT64 408; TT 64 71538

Unclassified report

Unedited rough draft trans. from Izvestiya (USSR) 1962, no. 10, p. 4.

Descriptors: (*Solar flares, Astronomy), Solar radiation, Magnetic storms, Solar spectrum, Plasma physics, Magnetic fields, Analysis, USSR.

The solar flare phenomina is investigated by examining its source, characteristics, and its effects. A theoretical postulation considering the flares as electrical plasmas is considered.

AD-607 159 Div. 2, 4
OTS Prices: HC $2.00/MF $0.50

Florida State Univ., Tallahassee.
PRELIMINARY EXPERIMENTS IN CUMULUS MODELING WITH AN ANALOG TO THE RELEASE OF LATENT HEAT OF CONDENSATION.
Technical rept. no. 17,
by Seymour L. Hess. 30 Sep 64, 36p
Contract Nonr1600 00, Proj. NR082 071

Unclassified report

Descriptors: (*Cumulus clouds, Models (Similation)), (*Convection, Models (Simulations)), Vapors, Buoyancy, Chemical reactions, Hydrochloric acid, Sodium compounds, Hydroxides, Fluorescence, Reynolds number, Condensation, Thermodynamics.

Experiments were performed in modeling of cumuli in which the upward buoyancy is produced by a chemical reaction between acid and base solutions. The method of production of buoyancy is analogous to the release of latent heat of condensation in real cumuli. The experimental convection was found to have a Reynolds number about the same as in small cumuli but a Froude number about one order of magnitude larger than in real cumuli. (Author)

AD-607 171 Div. 2
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
LATITUDINAL VARIATION OF MESOPAUSE HEIGHT INFERRED FROM ECLIPSE OBSERVATIONS,
by G. F. Schilling. Oct 64, 23p RM-4321-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Upper atmosphere, Atmospheric temperature), (*Lunar eclipses, Astronomical data), High altitude, Reflection, Geophysics, Atmosphere, Density.

Observations of the flattening of the earth's shadow during lunar eclipses were used to compute the magnitude of a latitudinal height variation of the shadow-producing level. By means of a postulate that this level is associated with a temperature minimum in the earth's upper atmosphere, a latitudinal variation is inferred for the mesopause, with the equatorial height being about 25 km greater than the height over the poles. Further inferences led to the conclusion that a double mesopause may be a consistent feature, and that the separation distance between the two mesopause altitudes could vary from a maximum of about 30 km over the equator to zero over the poles. It was finally shown that these conclusions were not necessarily inconsistent with the sparse experimental data presently available. (Author)

AD-607 196 Div. 2, 25
OTS Prices: HC $4.00/MF $0.75

Inosphere Research Lab., Pennsylvania State Univ., University Park.
TECHNIQUES FOR TREATING FULLY IONIZED TWO-PARTICLE PLASMA EQUATIONS.
Scientific rept.,
by R. E. Hartle. 1 Jun 64, 116p IRL-209
Contract AF19 628 4014; Grant NSF G18983,
Proj. 8605, Task 860502
AFCRL 64 548

Unclassified report

Descriptors: (*Plasma physics, Continuum mechanics), (*Partial differential equations, Numerical methods and procedures), Dynamics, Plasma oscillations, Electromagnetic waves, Propagation, Time, Series, Power series, Gas ionization, Magnetic fields, Charged particles, Dipole moments, Magnetic storms, Scientific research, Kinetic theory.

The purpose of this work was to develop analytical methods for treating the Boltzmann-Maxwell or associated continuum equations for fully ionized two-particle plasma equations and to demonstrate their uses through specific examples. The descriptive equations were treated exactly; that is, the usual linearization approximation was not made. A time series expansion method along with the method of partial summation was applied to the cold plasma equations. More specifically, the dependent variables were expanded in time power series and the coefficients were determined as functionals of the initial functions. Partial summation was applied to groups of terms in each expansion. The result was written in a convenient form comparable to that obtained by others

erties, Aerosols, Diffusion, Guided missile tracking systems.

The upper atmosphere parameters which are discussed are vertical autocorrelation scale of the mean winds, motion spectrum scale of the mean winds, motion spectrum of the turbulent winds, mixing length scale, scale of the smallest eddies, correlation scales of the turbulent velocities, dissipation length parameter from turbulent winds, globule size scales and cutoff altitude, time scales of motion, energy balance of the motion, and criteria for the onset of turbulence. The upper atmosphere motions such as are reported will 'reshape' missile trails into similar configurations. Hence from the detailed knowledge of the characteristics which missile trails will take in the upper atmosphere, it should be less difficult to develop apparatus for controlling and/or detecting missile trails. (Author)

AD-607 067 Div. 2,
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SURFACE DISPLACEMENTS IN AN ELASTIC HALF-SPACE,
by H. A. Lang. 1 Apr 58, 42p P-1498
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Mechanical waves, Propagation), Geophysics, Shear stresses, Elasticity, Velocity, Mathematical analysis, Integral transforms, Differential geometry.

This is a preliminary report of results obtained in an investigation of elastic ground waves initiated by a point load (having a Heaviside time variation) acting on the surface of, in particular, an elastic half-space. The results consist of 1. Integral expressions for displacements and associated potentials everywhere in the half-space for the separate contributions from the P, S, M and Rayleigh surface wave systems. 2. Explicit expressions and curves for the surface displacements for each type of wave. The total surface displacements (evaluated for nu = 1/4) reduce to known expressions obtained by Pekeris. The term 'preliminary report' is intended to imply that the completeness of the solution and the physical interpretation of results will be discussed in subsequent papers. (Author)

AD-607 074 Div. 2, 12
OTS Prices: HC $4.00/MF $0.75

Rocket Power, Inc., Mesa, Ariz.
JUDI-ROBIN BALLOON DART SOUNDING VEHICLE.
Final rept. for 3 Jun 63-27 Mar 64,
by Clarence W. Watson. May 64, 112p
Contract AF19 628 2805, Projs. 6682,6670,
Tasks 668206, 667003
AFCRL 64 471
Unclassified report

Descriptors: (*Meteorological balloons, Flight testing), Atmosphere sounding, Density, Wind, Meteorological parameters, Radar tracking, Temperature, Thermal insulation, Ablation, Coatings, Telemeter systems, Payload, Rocket motors, Inflatable structures, Simulation, Launching, Spheres.

The development of the JUDI-ROBIN BALLOON DART under the subject contract is described. The system has been designed to provide a low cost, passive meteorological system to obtain atmospheric density and wind data at altitudes from 100,000 to 215,000 feet. The sensor is a superpressurized mylar balloon which is one meter in diameter and contains a corner reflector. The balloon is tracked by radar and the desired information is obtained from the position-time history. Sixteen balloons were ejected from the DART in a vacuum chamber and 15 flight tests were conducted at White Sands Missile Range and Eglin Air Force Base. Two additional flights were conducted with telemetry aboard to measure the internal temperatures of the dart. The program demonstrated that the balloon could be ejected reliably at the desired altitude. Some difficulties were experienced with the balloon inflation, on the first three flights. However, an additional coat of insulating material solved this problem on subsequent flights. The standard ROBIN balloon system was used. Data reduction was not included in this contract. (Author)

AD-607 080 Div. 2
OTS Prices: HC $4.00/MF $1.00

Geophysics Lab., Mass. Inst. of Tech., Cambridge.
LOW-FREQUENCY ELECTROMAGNETIC OSCILLATIONS OF THE EARTH-IONOSPHERE CAVITY,
by T. Madden and W. Thompson. 22 Sep 64, 130p
Contract Nonr1841 75, Proj. NR371 401
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Ionosphere, Electromagnetic properties), Low frequency, Electromagnetic waves, Oscillation, Resonance, Mathematical models, Geophysics.

The observational and theoretical work on the low frequency electromagnetic oscillations of the earth-ionosphere cavity, known as the Schumann resonances, is reviewed. Additional theoretical considerations are introduced that allow the models to incorporate all the important complications of the real ionosphere. The comparisons between the theoretical predictions and the observational data lead to implications about the structure of the very low ionosphere, and the geometry of ionospheric perturbations which are discussed. (Author)

AD-607 089 Div. 2
OTS Prices: HC $4.00/MF $0.75

Johann Wolfgang Goethe Univ., Frankfurt-AM-Main (West Germany).
INVESTIGATIONS ON TROPOSPHERIC WASH-OUT. Final rept.,
by Hans-Walter Georgii and Erich Weber. Aug 64, 102p
Contract AF61 052 249
AFCRL 64 816
Unclassified report

Descriptors: (*Troposphere, Air pollution), (*Air pollution, Atmospheric precipitation), (*Atmospheric precipitation, Air pollution), Atmosphere, Transport properties, Waste gases, Dust, Aerosols, Meteorological parameters, Chemical analysis.

This report summarizes the results of chemical analyses of individual cases of precipitation sampled at different locations. The locations showed a great variety with respect to altitude, climate and level of industrial and anthropogeneous pollution. Furthermore detailed analyses and continuous records of the trace-substance concentration during individual rainfalls are discussed. The variations of the concentration during the course of the rain and their relations to quantity, intensity and types of rain as well as to meteorological parameters, are discussed. Finally, preliminary studies on the incorporation of trace-substances into cloud- and rain-drops are presented, indicating the relative importance of rainout compared to washout. (Author)

AD-607 309 Div. 2
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
WHY IS THE CLIMATE CHANGING,
by M. Rostarchuk. 24 Sep 64, 6p
FTD TT64 691; TT 64 71559

Unclassified report

Unedited rough draft trans. from Pravda, Leningrad (USSR) 1963, no. 28, 2 Feb, p. 4.

Descriptors: (*Atmospheric temperature, Earth), (*Climatology, Polar regions), Ice, Meteorology, USSR.

The reason for the variations in the terrestrial climate zones lies in the fact that the ices of the polar caps, sliding down to their previous address distrub the equilibrium of the earth. In conjunction with this, our planet changes its position relative to its axis of rotation. Thus, the geographic poles are moved, and a change occurs in the climatic zones of the planet.

AD-607 330 Div. 2
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
GRAVITY ANOMALIES AT ALTITUDE,
by A. D. Wheelon. 10 May 56, 8p GM-TM-79

Unclassified report

Descriptors: (*Gravity, Potential theory), (*Potential theory, Gravity), Special functions (Mathematical), Geophysics.

How to extrapolate a complete set of ground measurements to a specified altitude, so as to predict the local force of gravity is discussed.

AD-607 347 Div. 2, 3
OTS Prices: HC $1.00/MF $0.50

Aerospace Technology Div., Library of Congress, Washington, D. C.
GEOMAGNETIC RESEARCH BY THE SOVIET SHIP MIKHAIL LOMONOSAV: REVIEW ARTICLE.
Preliminary rept.
8 Oct 64, 18p
ATD P64 56; TT 64 71574

Unclassified report

Rept. on Surveys of Soviet-Bloc Scientific and Technical Literature, includes as appendix 'Pilot Survey of the Earths Magnetic Field with Magnetometers Towed behind an Iron Ship', by D. L. Finger and others, trans. of Geomagnetizm i Aeronomiya (USSR) 1961, v. 1, no. 3, p. 421-425.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Terrestrial magnetism, Oceanology), (*Magnetometers, Oceanographic equipment), (*Oceanographic vessels, USSR), Towed bodies, Ship hulls, Iron, Atlantic Ocean, Ocean currents, Heat transfer, Oceanographic data, Depth finding, Solar radiation, Plankton, Meteorological phenomena.

A preliminary report on geomagnetic research by the Soviet ship Mikhail Lomonosov, based on Soviet open literature is presented. The report includes all presently available pertinent information. The appendix contains the translation of an article on towed magnetometers considered to be significant enough to be rendered in its entirety.

AD-607 352 Div. 2
OTS Prices: HC $2.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
THE VIRIAL THEOREM FOR SELF-GRAVITATING AND RADIATING GASEOUS SYSTEMS AND ITS APPLICATIONS,
by S. P. S. Anand. Aug 64, 43p D1-82-0366;
Boeing-Math-360

Unclassified report

Prepared in cooperation with Yale Univ. Observatory, New Haven, Conn.
Also available from the author.

Descriptors: (*Stars, Magnetohydrodynamics), (*Magnetohydrodynamics, Stars), Interstellar matter, Gases, Kinetic theory, Tensor analysis, Astrophysics.

The virial tensor equation for self-gravitating gaseous systems in which radiation interacts with matter in the relative motion is obtained. The modified version of this equation in the presence of magnetic field and rotation is also given under the usual assumptions of hydromagnetics.

AD-607 354 Div. 2
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
THE MEAN DISTANCE TO THE MOON AS DETERMINED BY RADAR.
Interim rept.,
by B. S. Yaplee, S. H. Knowles, A. Shapiro, K. J. Craig, and D. Brouwer. 16 Sep 64, 22p
Proj. RR004 06 41 5200
NRL 6134

Unclassified report

Prepared in cooperation with Yale Univ. Observatory, New Haven, Conn.; presented at the IAU Symposium (no. 21) 'The System of Astronomical Constants' in Paris, France, 27-31 May 63.
Legibility of this document is in part unsatisfactory.

Descriptors: (*Moon, Radio astronomy), (*Radio astronomy, Moon), Maps, Range finding, Errors, Terrain.

The distance to the moon was measured by radar from October 1959 to July 1960 with a basic resolution of ±150m. The measured distance from the observing station to the nearest point of the moon was corrected for the earth's rotation and the motion of the moon. In addition, the libration of the moon changes the nearest point of reflection with time. As observations were made over many months, several returns from the same lunar area were obtained. The monthly variations in distance due to lunar topography were used to derive an equivalent radar topographical map around the central region of the moon. This map provided the necessary corrections to account for lunar topographical variations. All the measured distance after applying the above corrections were used in a least square solution with the best known constants. The solution yielded a value of 384,400 km ±1.2 km for the mean distance to the moon. The uncertainty of 1.2 km is mainly due to the uncertainty of the lunar radius. Using this mean distance, a value of 6,378,167 m for the earth's equatorial radius was determined. (Author)

AD-607 359 Div. 2
OTS Prices: HC $2.00/MF $0.50

Canterbury Univ., Christchurch (New Zealand).
OBSERVATIONS IN NEW ZEALAND OF GEOMAGNETIC MICROPULSATIONS IN THE 0.008 - 2.0 C/S BAND.

and from which some plasma properties were obtained. Both the time series method and the method of characteristics were applied to the Boltzmann-Maxwell system. The general time series solution was demonstrated useful through application to a plasma in a uniform magnetic field. The method of characteristics was discussed in general and also applied to the problem of a plasma in a uniform magnetic field. (Author)

AD-607 238 Div. 2
OTS Prices: HC $6.00/MF $1.25

California Research Corp., La Habra.
THEORETICAL STUDIES RELATED TO THE DETERMINATION OF SEISMIC ENERGY SOURCE DEPTH.
Final rept.
by T. W. Spencer, W. L. Baler, J. W. C. Sherwood, D. P. Squier, and R. D. Tooley. 15 Jul 64, 228p
Contract AF19 604 8344, Proj. 8652 ARPA Order 180 61, Task 865205
AFCRL 64 750

Unclassified report

Rept. on Proj. VELA-UNIFORM.

Descriptors: (*Seismology, Position finding), Seismic waves, Propagation, Time, Earth models, Geophysics, Theory.

This report summarizes work on a number of different but related topics, as folows: The effect of seismic source depth on Rayleigh wave spectra is examined for a dissipative half space and for an elastic layer overlying an elastic half space. In the two-layer earth model, the higher-mode amplitude spectra increase relative to the fundamental as the source approaches the base of the crust. The exact ray theory and matrix method are in principle devices for obtaining the response of a layered system over a limited time interval. Both methods prove to be inefficient from the standpoint of automatic computation but useful in analyzing certain general properties of the response functions in multilayered systems. Geometric ray theory is used to study the effects of layer thickness and range on the refracted arrival along a high-speed layer embedded in an infinite medium. The reflection of a plane compressional wave at a plane interface is analyzed with particular emphasis on the equation for continuity of the instantaneous energy flux. Inside the critical angle, Knott's equation gives continuity of the instantaneous flux, but beyond the critical angle Knott's equation must be replaced by three separate conditions. (Author)

AD-607 268 Div. 2
OTS Prices: HC $5.00/MF $1.00

Ionosphere Research Lab., Pennsylvania State Univ., University Park.
PARTICLE TRAJECTORIES IN A MODEL CURRENT SHEET, BASED ON THE OPEN MODEL OF THE MAGNETOSPHERE, WITH APPLICATIONS TO AURORAL PARTICLES.
Scientific rept.,
by T. W. Speiser. 10 Oct 64, 156p IRL-222
Contract AF19 628 4014; Grant NSF GP2914, Proj. 8605, Task 860502
AFCRL 64 726

Unclassified report

Descriptors: (*Particle trajectories, Charged particles), (*Upper atmosphere, Aurorae), Protons, Proton beams, Electrons, Distribution, Solar wind, Mathematical models, Computers, Acceleration.

The work is a study of charged particle trajectories about a current sheet which is based on Dungey's 'open model of the magnetosphere'. The object of the study is to see if charged particles incident on this current sheet, coming from the solar wind, and emerging as possible auroral particles, emerge in any kind of complex spatial distributions resembling auroral forms. Adiabatic theory, which is good throughout most of the magnetosphere, breaks down near a neutral point in the current sheet, and particle trajectories must, therefore, be computed. The computation is done using an IBM-7074 computer. Only proton trajectories are studied extensively, and the results yield accelerated output protons with high intensity in a thin sheet, with perhaps some thin beam structure within the sheet. (Author)

AD-607 277 Div. 2
OTS Prices: HC $2.00/MF $0.50

McGill Univ., Montreal (Quebec).
HEAT FLUX THROUGH THE POLAR OCEAN ICE.
Scientific rept. no. 12,
by E. Vowinckel. Sep 64, 32p AMRG-PM-70
Contract AF19 604 7415, Projs. 7628, 8623, Tasks 762804, 862303
AFCRL 64 751

Unclassified report

Descriptors: (*Arctic Ocean, Meteorology), (*Thermal conductivity, Arctic Ocean), (*Ice, Arctic Ocean), Heat transfer, Salinity, Density, Thickness, Aging (Materials), Polar regions.

It was found desirable to check the results of previously calculated heat release from the water of the Polar Ocean by an independent investigation of the amount of heat conducted through the Polar Ocean ice. Density and salinity of the ice were taken as constants and it was then necessary to determine the areal extent of the ice cover and the mean temperature and temperature gradients in the ice. Furthermore, the contributions of the different ice thicknesses to the total ice cover had to be determined for each month. The total heat flux was then determined by a weighted average for each month. The monthly flux values, reduced to the average sq cm of surface (made up of both ice and water), are given for various areas, and the annual flux through ice of different ages is given for the Central Polar Ocean. The flux values obtained are compared with the energy available from ocean currents (including export of ice). The correspondence is very close: The two alternatives for available energy are 8,486 cal/sq cm, year and 8,986 cal/sq cm, year. The calculated heat flux was 8,517 cal/sq cm, year. (Author)

AD-607 285 Div. 2
OTS Prices: HC $1.00/MF $0.50

Directorate of Scientific Information Services, Ottawa (Ontario).
SECULAR VARIATION OF THE GEOMAGNETIC FIELD AND UNUSUALLY ABRUPT CHANGES THEREIN,
by V. P. Orlov. Jul 64, 17p
DSIS T402R; NRC C4976

Unclassified report

Trans. of Akademiya Nauk SSSR. Institut Zemnogo Magnetizma Ionsfery i Rasprostraneniya Radiovoln. Trudy, 1961, no. 18(28) p. 77-86.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Terrestrial magnetism, Periodic variations), Magnetic storms, Geophysics, Magnetism, Solar disturbances, Numerical analysis, Graphics, USSR.

great efficiency of this method of investigating the optical features of the outer cover of the lunar surface. A comparison of the determinations of the color of a great quantity of sections of the lunar surface prove that the color of the lunar surface is very specific. Together with data concerning brightness, this has led to the conclusion that with respect to the characteristics of its reflecting capabilities, the matter of the cover of the lunar surface has no analogs either among terrestrial rocks or among meteorites. In this article new data on the visual colorimetry of the moon, based on observations and measurements performed primarily in 1954, are given. Certain explanations are also made relative to the application of the colorimetric method in the matter of investigating the reflecting capability in general.

3. Chemical Warfare Equipment and Materials

AD-607 280 Div. 3
OTS Prices: HC $1.00/MF $0.50

Southern Research Inst., Birmingham, Ala.
DESIGN STUDY TO DEVELOP INSTRUMENTATION FOR FIELD EVALUATION OF CHEMICAL AGENTS.
Bi-monthly progress rept.,
by Alvin N. Bird, Jr. 20 Oct 64, 6p
Contract DA18 108AMC32A

Unclassified report

See also AD-604 093.

Descriptors: (*Chemical warfare agents, Instrumentation), (*Gas detectors, Design), Television cameras, Electrolytic cells, Particles, Aerosols, Counting methods, Oximes, G agents, V agents, Samplers.

The report describes the work on the laboratory model flash-television particle counter and the electrochemical agent meter. The most important work on the particle counter was checking and refining the electronic counting circuits. The segmented wheel cell was equipped with a mechanism to coat the cell with oxime, and cell was checked with HCN and GB. These tests indicated that the principle of the wheel cell should be useful for measuring the concentration of GB as a function of time. The wheel cell is not suitable for measuring the concentration of VX as a function of time because of the long time delay in the V to G conversion filter. An agent-time meter that utilizes a different sampling technique was tried. This device will take a one liter sample of VX in about one second and read the concentration over a longer time, about one minute. A spontaneous electrolysis cell was used to read the agent concentration. The work on the particle counter, wheel cell, and the VX sampler are described. The assembly of the electronic counting circuits was completed. (Author)

Final rept. for Oct 62-Jan 64,
by B. J. Fraser and C. D. Ellyett. Jun 64, 38p
Grant Nonr G00020 63

Unclassified report.

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Terrestrial magnetism, Electromagnetic pulses), (*Electromagnetic pulses, Terrestrial magnetism), Solar disturbances, Magnetic storms, Lightning, Background, Amplifiers, Electronic equipment, Frequency shift, New Zealand, Measurement.

A study from a four channel narrow-band micropulsation apparatus operating in the 0.5 - 2.0 c/s band has been carried out. Both pearls and impulsive signals were found. Results show that pearls occur in association with sudden magnetic storm commencements (SSC's). Narrow-band frequency drifts are also evident in pearl events. Results of broad-band micropulsation studies in the 0.008 - 0.25 c/s band over the period October 1962 to January 1964 reveal solar region activity between the 6th and 9th days of the solar rotation in ten of the seventeen rotations observed. In one case this activity was present for six consecutive rotations, indicating a persistent active region. Preliminary frequency-time analyses of broad-band micropulsations recorded on portable transistorised equipment are also included. (Author)

AD-607 373 Div. 2, 30
OTS Prices: HC $3.00/MF $0.50

Bendix Corp., Southfield, Mich.
DEVELOPMENT OF A HYPSOMETER FOR ATMOSPHERIC SOUNDING.
Final engineering rept.,
by W. G. Wolber. Apr 64, 52p RLD-2601
Contract DA36 039sc84992, Proj. 3D36 04 031 01 06

Unclassified report

Descriptors: (*Hypsometers, Atmospheric sounding), (*Atmospheric sounding, Hypsometers), Meteorological instruments, Airborne, Rockets, Design, Performance (Engineering), Flight testing.

The summarized program resulted in the development of a miniature hypsometer for rocket-borne dropsonde application. The developed unit met or exceeded the contract specifications; it is believed that its range could easily be extended to measure altitudes to 300,000 feet. The sensing technique, the sensor's design and development, the laboratory performance tests, the actual rocket flight tests, and the development of a pressure calibration stand are discussed. (Author)

AD-607 379 Div. 2, 20, 25
OTS Prices: HC $6.00/MF $1.25

Stanford Electronics Labs., Stanford Univ., Calif.
WAVE PARTICLE GYRORESONANCE INTERACTIONS IN THE EARTH'S OUTER IONOSPHERE,
by T. F. Bell. May 64, 214p SEL-64-063, SEL-TR-3412-5
Grant AF AFOSR62 370
AFOSR 64 1908

Unclassified report

Descriptors: (*Plasma physics, Ionosphere), (*Ionosphere, Plasma physics), Very low frequency, Electromagnetic waves, Charged particles, Whistlers, Electron density, Terrestrial magnetism, Van Allen radiation belt, Particle trajectories, Cyclotron resonance phenomena, Geophysics, Nuclear physics.

An investigation is presented of certain aspects of those gyroresonance interactions which take place between very low frequency VLF electromagnetic waves and charged particle fluxes in the earth's outer ionosphere. These interactions, in which significant amounts of energy can be exchanged between the particle's kinetic energy form and the wave electromagnetic-energy form, are thought to be of importance with respect to the dynamical properties of the earths' outer ionosphere. Specifically two problems are considered. The first problem involves the stability of the outer ionosphere plasma to whistler-mode waves under conditions in which high energy electron fluxes permeate this plasma. The second problem involves the feasibility of the creation or depletion of an artificial radiation belt utilizing the geocyclotron gyroresonance interaction in order to transfer energy between man-made waves and relativistic electrons trapped in the outer ionosphere by the earths' magnetic field near the magnetic equatorial plane.

AD-607 389 Div. 2
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DETECTION OF MESOSPHERIC CLOUDS FROM A SATELLITE,
by Diran Diermandjian. May 62, 12p P-2579
Contract AF49 638 700

Unclassified report

Presented at the International Symposium on Rocket and Satellite Meteorology, W.M.O., I.U.G.G., and COSPAR, Washington, D. C., 23-25 Apr 62.

Descriptors: (*Clouds, Meteorological satellites), (*Meteorological satellites, Clouds), Noctilucent clouds, Photometers, Polar orbit trajectories, Particles, Polarization, Meteorological phenomena, Intensity.

The possibility of the photometric detection of mesospheric clouds from a low polar orbit satellite is discussed. As an example, it is shown that noctilucent clouds, under certain conditions, should be easily detectable at latitudes and seasons which are not suited to ground based observations. A simple satellite experiment is described which would also yield some data on the nature of the cloud particles. (Author)

AD-607 393 Div. 2, 25
OTS Prices: HC $2.00/MF $0.50

Redstone Scientific Information Center,
Redstone Arsenal, Ala.
INVESTIGATIONS ON THE COLORIMETRY OF THE MOON. PT. I. VISUAL COLORIMETRY OF INTEGRAL MOONLIGHT. PT. II. A NEW PROCESSING OF THE POTSDAM SPECTROPHOTOMETRY,
by V. V. Sharonov. 22 Sep 64 32p
RSIC 283; TT 64 71577

Unclassified report

Trans. of Leningrad Univ. Vestnik (USSR) 1955, v. 10, no. 11, Seriya Matematiki, Fiziki i Khimii, no. 4, p. 113-120; 1956, v. 11, no. 1, Seriya Matematiki, Mekhaniki i Astronomii, no. 1, p. 155-167.

Descriptors: (*Moon, Colorimetry), (*Spectroscopy, Moon), Spectrophotometers, Spectra (Visible and ultraviolet), Reflection, Surfaces, Brightness, Illumination, Sun, Albedo (Astronomy), Rock (Geology), Astronomical data, Extraterrestrial topography, Equations.

Works on the visual colorimetry of the moon, performed in recent times, have shown both the high accuracy and the

TOXIC VAPOR INDICATORS.
Final rept. for 2 Jul 62-2 Apr 63.
May 63, 47p DCN-294/7008/T9
Contract AF04-611 8501, Proj. 3850, Task 385004
RTD TDR63 1136

Unclassified report

Descriptors: (*Toxicity, Monitors), (*Vapors, Toxicity), (*Metal films, Monitors), Hazards, Personnel, Launch sites, Nitrogen compounds, Tetroxides, Fluorine, Hydrazine, Plastics, Silver, Vapor plating, Potassium compounds, Chlorides, Temperature, Humidity.

Results are presented of work performed in the development of thin film sensors for the detection of low concentrations of nitrogen tetroxide and fluorine. The effect of temperature and humidity on the response rates of the films is presented. Responses, in terms of increase in sensor resistance, of several percent per minute have been obtained for concentrations below 1 ppm. Based upon the results a laboratory model of a personnel dosimeter for nitrogen tetroxide and fluorine was built and submitted for field tests. (Author)

AD-607 054 Div. 4, 14
OTS Prices: HC $1.00/MF $0.50

Midwest Research Inst., Kansas City, Mo.
SYNTHESIS OF ELASTOMERS CONTAINING Si-N BONDS IN THE MAIN CHAIN.
Quarterly progress rept. no. 10, 1 Jul-30 Sep 64,
by L. W. Breed and R. L. Elliott. 14 Oct 64, 22p
Contract DA23 0720RD1687, Projs. 593 32 002, 2531C

Unclassified report

See also AD-602 453.

Descriptors: (*Elastomers, Synthesis (Chemistry)), (*Silicone plastics, Synthesis (Chemistry)), (*Organic nitrogen compounds, Elastomers), Heat-resistant plastics, Phenols, Polymers, Viscosity, Silanes, Heterocyclic compounds.

A new polymer from bisphenol A and the cyclic (Me2SiOSiMe2NMe)2 gave a tough, elastic polymer with an intrinsic viscosity of 2.22. The polymerization of aminosilanes with piperazines gave only low molecular weight polymers. The preparations of other silazane monomers and intermediates are described. (Author)

AD-607 085 Div. 4, 14
OTS Prices: HC $2.00/MF $0.50

Aerospace Research Center, General Precision, Inc., Little Falls, N. J.
HIGH-TEMPERATURE RESISTANT POLYMERS.
Quarterly progress rept. no. 3, 1 Jul-30 Sep 64,
by J. Luloff and C. Vogel. 15 Oct 64, 41p
Contract NObs90194

Unclassified report

See also AD-602 794.

Descriptors: (*Heat-resistant plastics, Phthalocyanines), (*Phthalocyanines, Polymerization), (*Silicon compounds, Heat-resistant plastics), (*Organoboranes, Polymerization), Resorcinol, Polymers, Boranes, Titanium compounds, Chemical properties, Aluminum compounds, Synthesis (Chemistry).

Condensation polymer synthesis studies were initiated with an investigation of the dihydroxysilicon phthalocyanine-resorcinol system. A crystalline polymer intermediate was isolated and is being characterized. The synthesis of difunctional carborane and neocarborane comonomers for use in similar condensation polymerization reactions was actively pursued. 6, 9-bis(acetonitrilo)decaborane was prepared and converted sequentially to 1, 2-bis(acetoxymethyl)carborane and 1, 2-bis(hydroxymethyl)carborane. Carborane was also synthesized by the basic permanganate oxidation of the carborane diol. An investigation of the titanium phthalocyanine system resulted in the isolation and characterization of the novel +2 valence compound, PcTi. This compound is soluble and stable in sulfuric acid, forming a brown solution, but it can be oxidized in that medium to phthalimide by persulfate. Continued attempts to accelerate the formation of dichlorosilicon phthalocyanine were unsuccessful, but a high-pressure facility for the improved preparation of this material has been installed. The product from the reaction of Dabco with chloraluminum phthalocyanine in dimethylformamide underwent hydrolysis to form hydroxyaluminum phthalocyanine hydrate. (Author)

AD-607 108 Div. 4, 25
OTS Prices: HC $1.00/MF $0.50

Polymer Research Inst., Univ. of Massachusetts, Amherst.
THE POLARIZABILITY OF MOLECULES CONSIDERING INTERNAL FIELD EFFECTS USING A POINT DIPOLE APPROXIMATION.
Technical rept. no. 72 (NSF progress rept. no. 4),
by Earl M. Mortensen. 1 Sep 64, 19p
Contract Nonr3357 01, Grant NSF GP1693,
Proj. NR056 378

Unclassified report

Descriptors: (*Chemical bonds, Polarization), (*Molecular association, Polarization), Electric fields, Dipole moments, Vector analysis, Matrix algebra, Transformations (Mathematics).

AD-607 148 Div. 4, 7
OTS Prices: HC $1.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
MATERIALS AND STRUCTURES, MATERIALS AND PROCESSES ANALYSIS PROGRAM.
Semiannual technical rept. for 1 Jul-31 Dec 61,
by A. G. Whittaker, T.S. Lee, and F. M. Wachi.
28 Feb 62, 9p TDR-930(2240-53)TR-1
Contract AF04 647 930
DCAS TDR62 53

Unclassified report

Descriptors: (*Electrochemistry, Electrolytic cells), (*Electrolytic cells, Electrochemistry), Solids, Electrolytes, Electrodes, Metals, Electric currents, Voltage, Oxidation-reduction reactions, Surface properties, Polarization, Heat of activation Conductivity, Silver compounds, Nitrates, Potassium compounds, Sodium compounds, Calcium compounds, Chlorides, Hydrates, Eutectics, Copper compounds, Platinum, Silver, Copper.

A study was made of the electrochemistry of metal electrode-solid electrolyte systems, the difficulties encountered, and the results of these exploratory studies are discussed.

AD-607 157 Div. 4, 25
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NUCLEAR RESONANCE SPECTRA OF ISOPROPYL

4. Chemistry

AD-606 957 Div., 4
OTS Prices: HC $5.00/MF $1.00

Materials Research Lab., Pennsylvania State Univ., University Park.
KINETICS OF SOME SOLID STATE REACTIONS AT HIGH PRESSURE.
Technical rept. no. 18,
by Robert Joseph Zeto. 10 Jul 64, 152p
Contract Nonr656 20

Unclassified report

Submitted in partial fulfillment of Doctoral thesis.

Descriptors: (*Minerals, Reaction kinetics), (*Reaction kinetics, High-pressure research), Phase studies, Crystals, Catalysis, Crystallization, Transformations, Silicon compounds, Dioxides, Beryllium compounds, Fluorides, Germanium compounds.

The thesis comprises a kinetic study of some solid state reactions, and includes the influence of both temperature and high pressure on the rates of transformation. The following polymorphic reactions were investigated with temperature to 700 C and pressure to 100,000 bars: Si02-quartz to Si02-coesite; Si02-cristobalite to Si02-coesite; Si02-cristobalite to Si02 quartz; crystallization of Si02-glass; crystallization of BeF2-glass; crystallization of Ge02-glass; and Ge02-quartz to Ge02-rutile. In addition, the reverse transformation of both Si02-coesite and BeF2-coesite was investigated at high temperature and ambient pressure. (Author)

AD-606 973 Div. 4, 14
OTS Prices: HC $3.00/MF $0.75

National Carbon Co., Parma, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. SUPPLEMENT TO VOLUME X: THERMAL REACTIVITY OF AROMATIC HYDROCARBONS,
by T. Edstrom and I. C. Lewis. Aug 64, 84p
Contract AF33 616 6915, Projs. 7350, 7381,
Tasks 735002, 738102
WADD TR61-72 V10 Suppl.

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Graphite, Preparation), (*Hydrocarbons, Thermochemistry), (*Aromatic compounds, Thermochemistry), Heterocyclic compounds, Carbon, Pyrolysis, Chemical reactions, Reaction kinetics, Argon, Refractory materials.

A survey of the thermal reactivity of 84 aromatic hydrocarbons was given in AD-288 075. This supplement presents the extension of this study to 26 new aromatic hydrocarbons, 25 heterocyclic compounds, 76 substituted aromatics, and 14 binary mixtures of aromatic compounds. Differential thermal analysis was employed to delineate the thermal behavior during pyrolysis to 750C in an argon atmosphere. Emphasis is placed on the role of heteroatoms and the effects of ring substituents on the thermal reactivity of aromatic hydrocarbon precursors to carbon and graphite. (Author)

AD-606 989 Div. 4, 14
OTS Prices: HC $3.00/MF $0.75

American Cyanamid Co., Stamford, Conn.
CHEMILUMINESCENT MATERIALS.
Technical rept. no. 5, 1 Jun-31 Aug 64.
31 Aug 64, 63p
Contract Nonr4200 00, Proj. NR356 452, ARPA Order 299

Unclassified report

See also AD-602 272.

Descriptors: (*Luminescence, Materials), (*Photochemistry, Luminescence), Organic oxygen compounds, Chlorides, Hydrogen peroxide, Polycyclic compounds, Peroxides, Ions, Electrons, Exchange reactions, Synthesis (Chemistry), Quantum statistics, Electrochemistry, Fluorescence, Molecular structure.

Progress in determining mechanisms of processes fundamental to chemiluminescence is described with particular reference to: (1) studies of oxalyl chloride-hydrogen peroxide--9, 10-diphenylanthracene chemiluminescence; (2) studies of anthracene photoperoxide decomposition chemiluminescence; (3) studies of ion radical electron transfer chemiluminescence; (4) synthesis and exploratory studies of potentially new chemiluminescent systems. (Author)

AD-607 039 Div. 4
OTS Prices: HC $3.00/MF $0.75

Valley Forge Space Technology Center, Philadelphia, Pa.
RESEARCH ON ELECTRIC ARC REDUCTION OF CARBON DIOXIDE,
by Fred P. Rudek and Harold Warner. Jul 64, 56p
Contract AF33 657 11030, Proj. 6373, Task 637302
AMRL TDR64 62

Unclassified report

Descriptors: (*Carbon dioxide, Reduction (Chemistry)), Electric arcs, Chemical reactions, Heat of reaction, Gas flow, Oxygen, Carbon compounds, Monoxides, Electrodes, Laboratory equipment, High-temperature research, Plasma medium, Energy.

A program of applied research was conducted to determine the applicability of reducing carbon dioxide by an electric arc process. Testing of an electric arc reactor in the laboratory indicated that carbon dioxide conversion rates up to 50 percent by weight per pass were readily attainable with an electric arc plasma generated by repeated capacitor discharges. Energy efficiencies obtained ranged as high as 98.9 percent, but at appreciable carbon dioxide flow rates the measured efficiencies were approximately 50 percent. Preliminary material balances indicate a reactor flow rate of 26.2 pounds per day with an energy input of 13 kw hours per day are required to process 6.6 pounds of carbon dioxide per day. The use of a plasma for carbon dioxide processing offers the advantages of high-temperature gas processing (ie, arc temperatures to 5000K), while minimizing problems usually associated with high temperature reactors. (Author)

AD-607 046 Div. 4, 16, 23
OTS rices: HC $2.00/MF $0.50

Magna Corp., Anaheim, Calif.

Furthermore, the chemiluminescent decomposition of alkaline peroxide in the pressence of THF is extraordinarily bright, being readily visible to the eye, in the absence of sensitizers. A feature of many of the solvent system oxidations investigated is a post-peak emission recovery phase that, in some cases, results in a two-fold rise in the post-peak luminescence. This result suggests that the search for and isolation of reaction intermediates in these systems would be fruitful. (Author)

AD-607 211 Div. 4, 25
OTS Prices: HC $2.00/MF $0.50

Monsanto Research Corp., Dayton, Ohio.
INFRARED SPECTRA OF SELECTED ALIPHATIC AMIDES BETWEEN 700-250cm-1.
Rept. for Mar-Apr 62 and Jun 63-Mar 64,
by W. R. Feairheller, Jr., J. V. Pustinger, Jr., and J. E. Katon. Aug 64, 41p
Contract AF33 616 8465, Proj. 7360, Task 736005
ML TDR64 196

Unclassified report

Descriptors: (*Amides, Spectra (Infrared)), (*Infrared spectroscopy, Amides), Absorption spectrum, Molecular isomerism, Chemical bonds, Vibration, Carboxylic acids, Aldehydes, Ketones.

Spectral data for seventy-eight amides were recorded from 700 to 250/cm, and analyzed for spectra-structure correlations. The information obtained can be used in identification of these compounds. The spectra were found to be very rich in absorption bands and thus they would be useful in 'fingerprint' characterization when used in conjunction with the 4000 - 700/cm region. Some new group frequencies were observed and their assignments are discussed and compared with assignments previously published. A comparison of the C-C=O deformation frequencies of amides with that of acids, aldehydes and ketones is made. It is shown that this vibration gives rise to a good group frequency in all of these classes. (Author)

AD-607 222 Div. 4, 10
OTS Prices: HC $1.00/MF $0.50

Malaker Labs., Inc., High Bridge, N. J.
KINETIC STUDY OF ROCKET EXHAUST GASES.
Progress rept. no. 10.
15 Oct 64, 14p
Contract DA30 069ORD2918, Proj. 1A22901A211

Unclassified report

Descriptors: (*Exhaust gases, Reaction kinetics), (*Rocket propellants, Exhaust gases), Temperature, Thermal radiation, Measurement, Flames, Smokes, Combustion, Pressure, Photographic techniques, Photometers.

Measurements of both temperature and total radiant energy were made for two propellants designated by Picatinny Arsenal. Data were obtained for chamber pressures ranging from 400 to 1200 PSIG. Flame temperatures for the two propellants were not significantly different probably due to the selection of downstream points of measurements. In measuring radiant energy a photographic photometry method was employed. Since photographic materials have limited exposure latitude a dual image device was constructed to permit simultaneous recording of both bright and dim versions of the same image. A beam splitter and mirrors produced two essentially identical images and neutral filters introduced into one optical path reduced the intensity of one image. (Author)

AD-607 272 Div. 4, 17
OTS Prices: HC $4.00/MF $0.75

Dow Chemical Co., Midland, Mich.
ANALYTICAL METHODS FOR IMPURITIES IN CESIUM METAL.
Final rept. for 1 Jul 63-25 May 64,
by V. A. Stenger, O. U. Anders, C. E. Van Hall, R. J. Moolenaar, and W. R. Kramer. Aug 64, 116p
Contract AF33 657 11209, Proj. 7360, Task 736005
ML TDR64 199

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Cesium, Impurities), (*Chemical analysis, Cesium), Quantitative analysis, Neutron activation, Radioactivation analysis, Oxygen, Nitrogen, Carbon, Bromides.

Methods were developed and tested for the determination of oxygen, nitrogen, and carbon in cesium metal, in concentrations of from less than 10 to more than 300 parts per million. In general the methods appear to be free from interferences. Oxygen is the only impurity likely to be found in more than extremely small traces in high quality cesium metal. The determination of oxygen can be carried out by the nondestructive neutron activation method, newly developed to give sufficient sensitivity, or by a new modification of the butyl bromide method designed to improve the accuracy. Previously the latter procedure gave low results, demonstrated in the present work to have been caused by a reaction between cesium oxide and butyl bromide. The methods developed for nitrogen and carbon permit identification of the forms in which these elements are most likely to occur, even though their concentrations are in the order of only 5 ppm. (Author)

AD-607 278 Div. 4
OTS Prices: HC $4.00/MF $1.00

Leicester Univ. (England).
REACTIONS OF ORGANOMETALLIC COMPOUNDS.
Final rept.,
by C. Eaborn. 1964, 150p
Grant AF EOARDC61 1
ARL 64 215

Unclassified report

Prepared in cooperation with Sussex Univ. (England).
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Metalorganic compounds, Chemical reactions), (*Germanium compounds, Synthesis (Chemistry)), (*Silicon compounds, Synthesis (Chemistry)), Decomposition, Substitution reactions, Organic sulfur compounds, Molecular rotation, Catalysis, Chemical bonds, Halogen compounds, Aromatic compounds.

AD-607 286 Div. 4
OTS Prices: HC $1.00/MF $0.50

Pennsylvania State Univ., University Park.
SEPARATION OF THE RARE EARTH ELEMENTS.
Final rept.
[1963], 9p
Contract Nonr656 24, Proj. NR052 414

Unclassified report

Descriptors: (*Rare earth elements, Separation), (*Arsenic compounds, Amines), (*Amines, Synthesis (Chemistry)), Halogen compounds, Polymers.

COMPOUNDS SPECTRA OF TYPE A6B AND A6BX,
by J. Ranft. 22 Sep 64, 41p
FTD TT64 537; TT 64 71541

Unclassified report

Unedited rough draft trans. of Annalen der Physik (East Germany) 1962, ser. 7, v. 10, no. 1/2, p. 1-30. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nuclear resonance, Equations), (*Organic compounds, Nuclear resonance), Protons, Nuclear spins, Absorption spectrum, Line spectrum, Alcohols, Chlorides, Bromides, Iodides, Amines, Aldehydes, Esters, East Germany.

AD-607 172 Div. 4, 25
OTS Prices: HC $3.00/MF $0.75

Catholic Univ. of America, Washington, D. C.
VIBRATIONAL RELAXATION IN HYDROGEN CHLORIDE.
Final rept.,
by Jarus W. Quinn. 1 Jun 64, 66p
Contract AF19 604 5558, Proj. 7670, Task 767003
AFCRL 64 559

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Hydrochloric acid, Emissivity), Chemical bonds, Excitation, Vibration, Relaxation time, Microwaves, Light, Quantum statistics, Diffusion, Spectroscopy.

The equilibration of the vibrational degree of freedom of hydrogen chloride was studied at pressures below 3 cm of mercury. The gas was excited to emission in a pulsed, microwave discharge. The light was dispersed by a monochromator and its intensity measured as a function of time for all resolved vibration-rotation lines in the region of the HCl fundamental. These measurements give a direct measure of the population density of the excited gas. All evidence points to the fact that equilibrium is established quickly between the translational and rotational degrees of freedom relative to the vibrations. Hence the measurements give the rate at which vibrational equilibrium is reestablished after the pulse. The observed dependence upon pressure is opposite to what one would expect from a collisional deactivation theory. The behavior was related to a diffusion process in which vibrational deactivation occurs primarily at the walls of the discharge vessel. (Author)

AD-607 177 Div. 4, 14
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF OBTAINING 1, n-HEXAMETHYLPOLYDIMETHYL SILOXANES,
by K. A. Andrianov, M. V. Sobolevskii, T. A. Krasovskaya, and L. V. Sobolevskaya.
22 Sep 64, 6p
FTD TT64 549; TT 64 71552

Unclassified report

Unedited rough draft trans. of Russian patent 156553 (appl. 736310/23-4, 30 Jun 61).

Descriptors: (*Siloxanes, Polymerization), Silanes, Chlorides, Potassium compounds, Synthesis (Chemistry), Patents, USSR.

A method is proposed for obtaining 1,n-hexamethylpolydimethyl siloxanes which consists of the fact that polydimethylcyclosiloxanes are polymerized with the theoretical amount of alpha, omega-potassium-oxypolydimethylsiloxane at a temperature of 120C and the polymerization product is subsequently neutralized with trimethylchlorosilane. This yields a polymer with prefixed properties.

AD-607 200 Div. 4, 25
OTS Prices: HC $1.00/MF $0.50

Rensselaer Polytechnic Inst., Troy, N. Y.
MOLTEN CARBONATE ELECTROLYTES: ELECTRICAL CONDUCTANCE, DENSITY, AND SURFACE TENSION OF BINARY AND TERNARY MIXTURES.
Technical rept. no. 22,
by Anthony T. Ward and G. J. Janz. Nov 64, 24p
Contract Nonr591 10, Proj. 441 35

Unclassified report

To be pub. in Electrochimica Acta.

Descriptors: (*Carbonates, Electrolytes), (*Electrolytes, Carbonates), (*Alkali metal compounds, Electrolytes), Electrical conductance, Density, Surface properties, Surface tension, Liquid metals, Electrochemistry, Statistical processes, Equations, Tables, Lithium compounds, Sodium compounds, Potassium compounds, Mixtures.

The electrical conductance, density, and surface tension of the alkali metal carbonate systems Li2CO3 (53.3 mole%)-Na2CO3 (46.7 mole%); Li2CO3 (42.7 mole$) %) - K2CO3 (57.3 mole%); Na2CO3 (58 mole%) - K2CO3 (42 mole%); and Li2CO3 (43.5 mole%) - Na2CO3 (31.5 mole%) - K2CO3 (25.0 mole%) are reported for the temperature range 500C to 900C. Density and surface tension properties are approximately additive for these systems. The experimental conductances of the binary systems are found to obey Markov's empirical equation.

AD-607 201 Div. 4, 14
OTS Prices: HC $2.00/MF $0.50

Monsanto Research Corp., Everett, Mass.
CHEMILUMINESCENT SYSTEMS.
Technical rept. no. 1.
13 Oct 64, 34p MRB3009Q1
Contract Nonr4511 00, Proj. NR356 464, ARPA Order 299

Unclassified report

Descriptors: (*Photochemistry, Luminescence), (*Luminescence, Organic materials), (*Organic materials, Luminescence), Organic solvents, Oxidation, Catalysis, Chemical reactions, Photometers.

The objective during the first quarter was to design and procure the photometric instrumentation and to investigate empirically the response of typical known chemiluminescent reactions to solvent variation, catalysis, and, to a lesser extent, the addition of sensitizers. For this purpose, representative 'bright' and 'feeble' chemiluminescent reactions were chosen. The major effort in the first class was devoted to the oxidation of lucigenin, extending the work of Weber. As a result of checks for 'background' radiation, it was confirmed that the observations of Vassil'ev and Stauff of widespread feeble chemiluminescence accompanying oxidation reactions applied to many presumably quite pure organic solvents. It was also found that Vassil'ev's and Chandross' observations of sensitized increase of emission of many orders of magnitude apply to one system investigated (acetone). Tetrahydrofuran (THF) is a more efficient 'catalyst' for lucigenin chemiluminescence than previously investigated organic substances.

5. Communications

AD-607 116 Div. 5, 18, 30
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
SURVIVABILITY OF REDUNDANT COMMUNICATIONS SYSTEMS,
by S. L. Levine. 24 Sep 64, 45p TDR-269(4922)-3
Contract AF04 695 269
BSD TDR64 4

Unclassified report

Descriptors: (*Command and control systems, Survival), (*Communication systems, Models (Simulations)), (*Survival, Communication systems), Redundant components, Computers, Programming (Computers), Monte Carlo method, Probability, Pseudo-random systems, Combat information centers, Launching sites, Guided missiles.

A computer program is developed which is capable of investigating the survivability of a class of redundant communications systems. The systems simulated by the computer program are characterized by large numbers of communicating elements dispersed over an operations area. Each element has potentially perfect switching capabilities for relaying messages to neighboring elements. These systems are modeled by nodes, links, and zones. Nodes represent the communicating elements of the model; zones and links are used to describe the command and control organization. A node is an element that can receive and/or transmit information. A link represents communication between two nodes. Zones are arbitrary operations areas. By providing the required input data the program user is able to prescribe the number of each type node, command and control organization, communication capability, shape of the operational area, and system degradation. The computer performs a Monte Carlo analysis to obtain an estimate of the expected number of surviving missile launches controlled by at least one command post as a function of the model parameters.

AD-607 185 Div. 5, 8, 12
OTS Prices: HC $6.00/MF $1.25

Hughes Aircraft Co., Fullerton, Calif.
SATELLITE COMMUNICATIONS TERMINAL AN/MSC 46( ).
Quarterly progress rept. no. 2, 15 Apr-15 Jul 64,
by D. E. Ross. 15 Jul 64, 243p
HAC-FR-64-19-124, HAC-CDP-1568
Contract DA36 039AMC03744S

Unclassified report

Descriptors: (*Microwave communication systems, Communication satellites (Active)), (*Radio receivers, Microwave communication systems), (*Radio transmitters, Microwave communication systems), Voice communication systems, Teletype systems, Communication equipment, Tracking, Ground vehicle antennas, Modulators, Systems engineering, Design, Wiring diagrams, Microwave equipment, Mobile.

This report presents the results of the second quarter engineering effort toward producing a ground terminal for use with communication satellites. The objective of the program is to design, fabricate, assemble, and test a microwave air and ground transportable satellite communication link terminal and all auxiliary items necessary for operation with medium-altitude active satellite repeaters and subsequently for operation with 24-hour synchronous satellites. Ther terminal will provide up to four duplex voice and five duplex teletype.

AD-607 317 Div. 5, 2, 8, 18
OTS Prices: HC $2.00/MF $0.50

ITT Communications Systems, Inc., Paramus, N. J.
AIR WEATHER SERVICE TERMINAL AREA CONSIDERATIONS CODED GRAPHICS RECORDERS.
31 Aug 64, 47p ICS-64-TR-489
Contract AF19 628 3414
ESD TDR64 455

Unclassified report

Descriptors: (*Weather communications, Facsimile recording systems), (*Facsimile recording systems, Weather, communications), (*Meteorological charts, Facsimile transmission), Weather forecasting, Data transmission systems, Magnetic recording systems, Digital recording systems, Dielectric recording systems, Meteorological parameters, Mapping, Aif force, Analog systems, Feasibility studies.

Terminal area graphic recorders were studied with a view to meeting future AWS needs in transmitting graphic meteorological information. Utilizations of digital encoding and modern graphic reproduction techniques may satisfy the requirements of an increased traffic load with no increase in the present nominal 4 kc bandwidth. 'Coded Graphics' is defined as any method for transmitting hard copy having less redundancy than conventional line-by-line scanning facsimile. Generally, only non-white point locations on the copy are transmitted. Transmission of invariant portions, such as geographic background, may also be avoided. The number of non-white points in a message and the encoding method used will determine the length of time required to transmit the information. Coded graphics recorder techniques show superiority over presently used facsimile by providing multiple copies, and copies with better legibility and esthetic quality. Cost projections over a ten year period show that a savings may be possible using coded graphic techniques. Seven coded graphics recorder types were found to be applicable by this study. Three of the seven hold promise for future AWS network applications. A study of digital encoding techniques and establishment of a set of performance requirements is scheduled for follow-on contractual activity. (Author)

AD-607 391 Div. 5
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON DISTRIBUTED COMMUNICATIONS NETWORKS,
by Paul Baran. Sep 62, 51p P-2626

Unclassified report

Prepared for presentation at the Congress of the Information System Sciences (no. 1) Nov 62.

Descriptors: (*Communication systems, Survival), (*Survival, Communication systems), Networks, Redundant components, Distribution, Digital systems, Data transmission systems, Warfare, Models (Simulations), Probability, Monte Carlo method, Communication equipment, Reliability, Theory.

The survival of digital communication networks using links of less than perfect reliability in event of a physical attack is discussed. The use of redundant links between distributed communication centers is used to achieve distributed networks, interconnecting more centers with one another. The plan is analogus to present telephone plant switching networks.

Systematic investigations were undertaken on the synthesis of arsenic-containing amines which may be of use in the separation of rare earth elements.

AD-607 378 Div. 4
OTS Prices: HC $5.00/MF $1.00

Washington Univ., Seattle.
UNIMOLECULAR DECOMPOSITION AND SOME ISOTOPE EFFECTS OF SIMPLE ALKANES AND ALKYL RADICALS,
by B. S. Rabinovitch and D. W. Setser. 1 Jun 64, 164p
Contract Nonr477 36

Unclassified report

Prepared in cooperation with Kansas State Univ., Manhattan.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Aliphatic compounds, Decomposition), (*Photochemistry, Aliphatic compounds), (*Thermochemistry, Aliphatic compounds), Chemical reactions, Theory, Mathematical models, Hydrocarbons, Reaction kinetics, Isotopes, Hydrogen, Deuterium, Substitution reactions, Chemical bonds, Atomic energy levels, Free radicals, Methane, Butane.

The relevant aspects of the RRKM formulation for unimolecular reactions are set forth, with emphasis on the present status of the theory and the best techniques for carrying out computations simply. Characteristics of various model hydrocarbon-type molecular species are outlined and are used in theoretical calculations which illustrate various aspects of the theory. Some related aspects of kinetic isotope effects are considered and model calculations are also done for hydrogen-deuterium substitutions. It is shown how the specific rate constants are related to the experimental parameters of the various systems. The behavior of some C1-C4 alkanes and alkyl radicals are calculated as examples of highly important practical systems.

targets, Phase measurement, Digital computers, Target discrimination, Errors, Mathematical analysis, Equations, Statistical functions, Probability, Statistical data, Polarization, Tests, Stability, Theory.

The results of an investigation of analytical and analog techniques for reducing the influence of target support systems for radar scattering measurements are presented. An experimental system for analytically reducing the influence of target supports is implemented by incorporating a phase measurement system and a digital computer into an operational radar cross section measurement facility. Data are obtained by using the system to reduce the influence of the return of Styrofoam support columns during the measurement of 1/2-, 5/8-, 7/8-, and 2-inch diameter spheres and a 30-degree, 5.1-inch diameter sphere-cone as targets at L-Band. A cross section measurement error of about 7 db, resulting from the influence of the target support system, is reduced to about 1 db by using this discrimination system in the vicinity of nose-on in the case of the sphere-cone target. The discrimination system output is compared to a low background measurement on the sphere-cone. (Author)

AD-607 170 Div. 6, 8, 25
OTS Prices: HC $4.00/MF $1.00

Naval Research Lab., Washington, D. C.
DESIGN OF A PLANE-WAVE, NEAR-FIELD CALIBRATION ARRAY.
Interim rept.,
by S. Hanish, M. A. Blizard, and R. A. Matzner.
2 Sep 64, 149p
NRL MR1565

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Hydrophones, Design), (*Transducers, Calibration), (*Underwater sound equipment, Transducers), Field emission, Test equipment, Mathematical analysis, Programming (Computers), Tables.

The design and construction of a near-field hydrophone array for calibration of underwater transducers initiated by Trott was reviewed in detail. Considering the recommended procedures the authors proposed to build a near-field array to test a transducer having the dimensions of a 17 ft cube, at a frequency of 3 kc.

AD-607 253 Div. 6, 8, 9, 20
OTS Prices: HC $3.00/MF$0.50

RAND Corp., Santa Monica, Calif.
LOW-FREQUENCY HYDROMAGNETIC WAVES IN THE IONOSPHERE,
by Carl Greifinger and Phyllis Greifinger.
Oct 64, 55p RM-4225

Unclassified report

Descriptors: (*Ionospheric propagation, Electromagnetic waves), (*Nuclear explosions, Ionosphere), Atmosphere, Explosions, Detection, Explosion effects, Hydrodynamics, Electromagnetism, Low frequency, Wave transmission, Mathematical models.

In this report, the propagation through the ionosphere of low-frequency (1 cps) hydromagnetic waves is studied. The ionosphere is assumed to extend infinitely far in the upward direction and to terminate abruptly 80 km above a perfectly conducting flat earth. The charged particle density is assumed to be constant throughout the ionosphere, and the neutral particle density to vary exponentially with altitude. The coupled hydrodynamic and electromagnetic equations for the medium are linearized, and, with the approximations valid for low-frequency waves, the resulting system is shown to reduce to a second-order wave equation. A solution of this equation is obtained for a disturbance which is initially localized high in the ionosphere (i.e., at an altitude at which collisions of ions with neutrals can be neglected). The effects of the model ionosphere on hydromagnetic disturbances are contained in a dispersion relation. In particular, the ionosphere is found to possess certain characteristic frequencies, which appear as the roots of this dispersion relation. (Author)

6. Detection

AD-607 031 Div. 6, 12
OTS Prices: HC $6.00/MF $1.25

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A METHOD FOR DETERMINING THE EFFECT OF DYNAMIC ERRORS OF A RADAR SATELLITE TRACKER ON ORBIT PREDICTION.
Master's thesis,
by Thomas Henry McMullen. 26 Aug 64, 217p
AFIT GA/EE/64 6

Unclassified report

Descriptors: (*Space surveillance systems, Radar tracking), (*Satellites (Artifical), Radar tracking), (*Radar tracking, Errors), (*Orbital trajectories, Determination), Celestial mechanics, Azimuth, Polynomials, Functions, Integral transforms, Least squares method, Programming (Computers).

This thesis briefly discusses the difficulty of specifying the accuracy of a satellite tracker. Equations are developed which: (1) determine azimuth and elevation angle data and fit them to fourth order time polynomials; (2) compute the orbit parameters from evaluations of these polynomials; and (3) evaluate the response of a selected tracker transfer function to the input of these time polynomials by the method of Laplace transformation. Orbit elements computed from this last evaluation are compared with the previous set to obtain the error in orbit prediction. A Fortran II program is presented which performs these computations on the IBM 7094 digital computer.

AD-607 033 Div. 6, 12, 15
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
MULTISATELLITE CONTROL.
Master's thesis,
by Aloysius Gerald Casey. Aug 64, 111p
AFIT GA/EE/64 1

Unclassified report

Descriptors: (*Space surveillance systems, Control systems), (*Satellites (Artificial), Control systems), (*Satellite networks, Scheduling, Orbital trajectories, Tracking, Programming (Computers), Programming languages, Operations research, Time, Tables.

The thesis provides a method of controlling a system of orbiting satellites through a net of servicing ground stations. The problem is defined and a solution based on a dual view of the time spectrum is selected. That is, the vital service requirements are scheduled horizontally across the scheduling period, while the routine reports are treated vertically in time. The thesis includes a computer program written in the Fortran IV language and based on the logical development explained in the thesis. A 10 satellite-5 ground station example problem is presented. (Author)

AD-607 043 Div. 6, 12
OTS Prices: HC $5.00/MF $1.00

Marchetti (J. W.), Inc., Natick, Mass.
100 MEGACYCLE VHF RE-ENTRY RADAR FOR STALLION SITE, WHITE SANDS MISSILE RANGE, AN/TPQ-20.
Final rept.
Aug 64, 166p
Contract AF30 602 2824
RADC TDR64 303

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Reentry vehicles, Radar tracking), (*Radar tracking, Reentry vehicles), (*Wake, Radar echo areas), Atmosphere entry, Oscilloscopes, Photographic recording systems, Continuous-strip cameras, Yagi antennas, Radar pulses, Very high frequency, Radar equipment, Calibration.

A 100-megacycle, 1-megawatt, variable pulse width (1, 2.5 and 5 microseconds) radar, the AN/TPQ-20, was installed at the Stallion Site, White Sands, New Mexico, for the purpose of viewing and photographically recording A-scope displays of the Athena test vehicles. Vertically polarized signals were transmitted and two receivers used, one for vertically polarized and one for horizontally polarized signals. The vertical and horizontal signals were recorded photographically on a pulse to pulse basis, together with range time. Ancillary data was paper recorded on Brush recorders. The antenna consists of five yagis mounted on an azimuth elevation mount and pointed to the area of interest by slaving the entire mount to an FPS-16 or L/UHF precision radar. (Author)

AD-607 053 Div. 6, 2, 12, 30
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Redondo Beach, Calif.
ELECTRONIC SYSTEMS DIVISION PRECISION ORBIT DETERMINATION PROGRAM.
Quarterly rept. no. 3.
15 Apr 64, 38p STL-8497-6070-RU000
Contract AF19 628 594, Proj. 496L
ESD TDR64 452

Unclassified report

Descriptors: (*Orbital trajectories, Determination), (*Space surveillance systems, Computers), (*Computers, Space surveillance systems), Radar tracking, Programming (Computers), Integration, Cellestial mechanics, Geophysics, Earth models.

The report under covers certain technical and mathematical considerations which are germane to the accuracy of ESPOD. Particular emphasis is given to numerical integration process, the calculation of the vernal equinox, and the interpretation of the earth potential model. (Author)

AD-607 136 Div. 6
OTS Prices: HC $7.00/MF $1.75

General Dynamics/Fort Worth, Tex.
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF A TECHNIQUE FOR REDUCING EXTRANEOUS SIGNALS IN RADAR SCATTERING MEASUREMENTS.
Rept. no. 8,
by W. P. Cahill and C. C. Freeny. Jul 64, 383p
FZE-222-8
Contract AF30 602 2831, Proj. 6503
RADC TDR64 418

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radar echo areas, Measurement), (*Radar clutter, Reduction), Radar reflections, Scattering, Radar

Descriptors: (*Thermoelectricity, Buoys), (*Buoys, Power supplies), Thermocouples, Generators, Design, Bismuth alloys, Tellurium alloys, Lead alloys, Germanium alloys, Modules (Electronic), Life expectancy, Electric power production, Lead, Bismuth, Tellurium, Germanium.

During this reporting period the preliminary design of the thermoelectric generator, electric control, fuel piping and air ducting has been finalized and the information is in drafting. The mechanical design of the control unit was changed to incorporate the recommendations of the design review board. The bismuth-telluride module life test has accumulated over 2000 hours of operation with only 3.8% deterioration in power output. Test and feasibility couples of the lead-telluride, germanium-bismuth-telluride type have been built. (Author)

AD-607 146 Div. 7, 4, 12
OTS Prices: HC $3.00/MF $0.75

Westinghouse Research Labs., Pittsburgh, Pa.
CEROLYTE FUEL CELL.
Quarterly technical progress rept. no. 2,
by D. H. Archer, E. F. Sverdrup, L. Elikan, and W. A. English. 15 Jun 64, 82p
Contract AF33 615 1425, Proj. 8173, Task 817303 17
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-601 817.

Descriptors: (*Fuel cells, Design), (*Electrochemistry, Fuel cells), Electrodes, Platinum, Polarization, Oxygen, Adsorption, Hydrogen, Water vapor, Electrolytes, Ceramic materials, Batteries and components, Heaters, Thermal insulation, Heat transfer, Spacecraft, Power supplies.

Detailed information is presented on two aspects of work on Cerolyte Fuel Cells: (1) the measurement of polarization voltage losses; and (2) the overall design of a 50-watt Cerolyte Fuel-cell Battery. The effects of curent density and temperature on polarization voltage losses for fused-platinum electrodes both absorbing and desorbing oxygen in a H2-H2O atmosphere were obtained. The measurement techniques developed will be useful in determining the fabrication conditions for producing optimum electrodes for cerolyte cells. A preliminary design for a 50-watt battery was completed; it consists of (1) a metal base-plate including the battery manifolding and tubular battery support; (2) battery casing; and (3) insulation. The testing work on 5-cell batteries was continued.

AD-607 175 Div. 7
OTS Prices: HC $2.00/MF $0.50

Naval Applied Science Lab., Brooklyn, N. Y.
LIMITING SYNCHRO LOADS IN 400 CYCLE CONTROL, TORQUE AND MIXED SYSTEMS FOR MIL-S-20708A SYNCHROS.
Final rept., pt. 1,
by J. Locker. 1964, 39p
NASL 5441 5
Unclassified report

Descriptors: (*Synchros, Military requirements), Servomechanisms, Torque, Control systems, Electrical properties, Specifications, Electrical engineering.

Limiting synchro loads in 400 cycle systems, load current for 3 percent voltage regulation and optimum capacities have been determined for synchros fabricated under military specification MIL-S-20708A. Limiting loads have been determined from measured synchro parameters, applied to formulae developed by the Laboratory. Synchro loads that may be carried in control, torque and mixed control-torque systems are tabulated in the report. Load currents and optimum values for synchro capacitors, two of the parameters used to determine synchro loads, are also tabulated. (Author)

AD-607 176 Div. 7
OTS Prices: HC $2.00/MF $0.50

Naval Applied Science Lab., Brooklyn, N. Y.
LIMITING SYNCHRO LOADS IN 60 CYCLE CONTROL, TORQUE AND MIXED SYSTEMS FOR MIL-S-20708A SYNCHROS.
Final rept., pt. 2,
by C. J. Dipietro. 17 Jul 64, 33p
NASL 5441 5
Unclassified report

See also AD-607 175.

Descriptors: (*Synchros, Military requirements), Servomechanisms, Torque, Control systems, Electrical properties, Specifications, Electrical engineering.

Limiting synchro loads in 60 cycle systems, load current for 10 percent voltage regulation and optimum capacities have been determined for synchros fabricated under military specification MIL-S-20708A. Limiting loads have been determined from measured synchro parameters, applied to formulae developed by the Laboratory. Synchro loads that may be carried in control, torque and mixed control-torque systems are tabulated in the report. Load currents and optimum values for synchro capacitors, two of the parameters used to determine synchro loads, are also tabulated. (Author)

AD-607 206 Div. 7, 25
OTS Prices: HC $2.00/MF $0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
MAGNETOHYDROHYNAMIC POWER GENERATION EXPERIMENT,
by F. C. Foshag and A. E. Were. 14 Dec 59, 32p
R59SD447
Contract AF04 647 269
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Magnetohydrodynamics, Generators), (*Power supplies, Magnetohydrodynamics), Plasma jets, Magnetic fields, Plasma medium, Additives, Potassium compounds, Carbonates, Electrical conductance, Circuits, Electrodes.

An experimental study was conducted to show the feasibility of generating electrical power with the plasma jet created by a 2500 KW AC Air Arc. The arc utilized is located in the GE - M. S.V.D. Arc Test Cell. A maximum power of 900 watts was generated with a 0.4 ohm resistive load. A magnetic field strength of 8600 gauss was utilized, and the plasma was seeded with potassium carbonate to increase its electrical conductivity. With the magnetic field, but without seeding, a maximum power of 33 watts was generated. (Author)

AD-607 293 Div. 7, 12
OTS Prices: HC $4.00/MF $0.75

Delco-Remy Div., General Motors Corp., Anderson, Ind.
FEASIBILITY STUDIES OF THE ELECTROTHERMALLY

7. Electrical Equipment

AD-606 879 Div. 7, 26
OTS Prices: HC $2.00/MF $0.50

Burgess Battery Co., Freeport, Ill.
BATTERY, DRY, VEST TYPE BA-398( )/PRC-25.
Rept. no. 1 (Final) 1 Jul 63-30 Jun 64,
by C. J. Broughton. 30 Jun 64, 32p
Contract DA36 039AMC02348E, Task 1C6 22001A053 02
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Primary cells, Portable), (*Batteries and components, Portable), Zinc, Manganese, Dioxides, Electric cables, Manufacturing methods, Tests.

The feasibility of BA-398 ( )/PRC-25 vest battery was investigated. The design of battery complements was accomplished by using electrolytic manganese dioxide and Burgess Spun Paste Cells. Production of the batteries was accomplished without any problems. The design of the cell and cell blocks were planned so that they could be made with current production equipment, the purpose being that this would insure production methods and practices necessary for a smooth operation. (Author)

AD-606 999 Div. 7, 4
OTS Prices: HC $2.00/MF $0.50

Delco-Remy Div., General Motors Corp., Anderson, Ind.
ZINC ELECTRODE INVESTIGATION.
Quarterly technical progress rept. no. 1, 1 Jul-1 Oct 64,
by J. J. Lander and J. A. Keralla. 15 Oct 64, 36p
Contract AF33 615 1583, Proj. 8173, Task 817304
Unclassified report

Descriptors: (*Storage batteries, Electrodes), (*Electrodes, Zinc), (*Zinc, Electrodes), Catalysts, Palladium, Aluminum compounds, Oxides, Hydrogen, Oxygen, Recombination reactions, Impurities, Tin, Lead, Silver, Binders, Epoxy plastics, Polyvinyl alcohol, Electrolytes, Surface-active substances.

Initial experiments with one to five grams of a palladium-on-alumina catalyst for hydrogen-oxygen recombination in sealed cells was successful in maintaining low gas pressures for an 0.5 ampere overcharge condition for up to eight hours. Tin and lead impurities in the negative plate up to 5% were tested for their effects on cycle life. There was no observable effect, either beneficial or deleterious. Effects of silver impurities are uncertain. Cells containing negative plates formulated with broad ranges of composition of both polyethyleneoxide and polyvinyl alcohol were cycle-life tested. The results indicate that 2% polyvinyl alcohol gives best life and voltage performance. Other experimental work under way is described. (Author)

AD-607 029 Div. 7, 4
OTS Prices: HC $2.00/MF $0.50

Melpar, Inc., Falls Church, Va.
A THIN-PLATE BATTERY. SUPPLEMENT TO THIN-FILM MONOTRONICS.
Quarterly rept. no. 2, suppl., 12 Jun-12 Sep 64,
by J. Smit and H. H. Titus. 12 Sep 64, 40p
Contract NOw64 0568d
Unclassified report

See also AD-602 395

Descriptors: (*Batteries and components, Primary cells), (*Power supplies, Primary cells), Electrical properties, Performance (Engineering), Low temperature research, Electrolytes, Ammonia, Salts, Organic compounds, Electrodes, Molecular electronics, Electrochemistry, Feasibility studies.

The program is directed toward demonstrating the feasibility of utilizing a liquid-ammonia-activated system to produce a practical high-power output, reserve, primary battery. The liquid-ammonia-activated system, upon which this program is based, contains as the electrochemical couple a light, active metal anode and a reducible organic nitro compound cathode material. The electrolytic solution for the couple is formed from anhydrous liquid ammonia and a salt. Previous work conducted has shown that this system is capable of operating through the military range; furthermore, it can be made to operate at the required current density. (Author)

AD-607 086 Div. 7
OTS Prices: HC $3.00/MF $0.50

Radio Corp. of America, Lancaster, Pa.
THE DEVELOPMENT OF A LOW-TEMPERATURE CYLINDRICAL THERMIONIC GENERATOR.
Quarterly technical rept. no. 2.
30 Sep 64, 54p
Contract AF33 615 1547, continuation of Contract AF33 616 7903, Proj. 8173, Task 817305-9
Unclassified report

Also see AD-601 906.

Descriptors: (*Thermionic converters, Design), (*Energy conversion, Thermionic converters), Electric power production, Power equipment, Heaters, Liquid metals, Seals (Stoppers), Tests, Life expectancy, Injection, Materials, Molybdenum, Nickel, Tungsten compounds, Oxides, Niobium, Helium group gases, Ceramic materials, Thermal radiation.

A converter Type A-1198B, Serial No. 14, remained on life test for 4470 hours at approximately 150 percent of output power rating with a constant level of 63 watts. The three-converter module A-1274, Serial No. 10 was operated over an emitter temperature range of 1200 to 1350 C for approximately 30 hours with a maximum output of 76 watts. Fabrication of two improved type A-1274 modules was completed. Preliminary tests of these modules indicated the need for modifications of the end-cap diaphragm, ceramic-to-metal seal, and radiator fin configuration. The design and fabrication of the gas injection system was completed and preliminary tests of the system were begun. Two A-1194E converter test vehicles were built to evaluate nickel and molybdenum matrix impregnated with tungsten trioxide as collector materials. Two modified A-1195 variable spacing converters were built, and molybdenum and niobium collectors were tested at high collector temperatures.

AD-607 138 Div. 7
OTS Prices: HC $1.00/MF $0.50

Westinghouse Electric Corp., Lima, Ohio.
100 WATT THERMOELECTRIC POWER SYSTEM FOR BUOY APPLICATIONS.
Monthly progress rept. no. 4, 11 Sep-11 Oct 64.
11 Oct 64, 3p
Contract N600 61533 61992
Unclassified report

8. Electronics and Electronic Equipment

AD-606 875 Div. 8, 26
OTS Prices: HC $3.00/MF $0.75

Tung-Sol Electric, Inc., Bloomfield, N.J.
ELECTRON TUBES RADIATION RESISTANT PILOT LINE PRODUCTION.
Quarterly progress rept. no. 4, 1 Mar-31 May 64,
by T. B. Parks and John Grimm. 30 Jun 64, 70p
Contract DA36 039AMC01476E

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-601 680

Descriptors: (*Electron tubes, Production), Reliability (Electronics), Nuclear particles, Radiation damage, Aluminum compounds, Silicates, Furnaces, Vacuum apparatus, Tests, Industrial equipment.

The contractual work specified under Phase II has been continued. Production of alumino-silicate stems for the three types, 6080WB, 6360, and 6205, has continued, utilizing the conveyor furnace and cracked city gas, with satisfactory yield. Equipment necessary for this phase has been completed and evaluated. Tubes of all four types have been sealed-in and processed on the dual vacuum exhaust system, being baked at 800 C. Exhaust schedules are being evaluated. Tubes thus exhausted have been based (as necessary), aged, and tested and aging schedules are being evaluated. High temperature life tests (500 C bulb temperature) have been started on 6080WB and 6205 and improvements applied to the tube design and/ or processing as a result of this. Nuclear radiation testing facilities have been scheduled for both pulsed and steady-state operation of the tubes as specified in the contract. (Author)

AD-606 901 Div. 8, 28
OTS Prices: HC $3.00/MF $0.75

Bureau of Naval Personnel, Washington, D. C.
NAVAL DICTIONARY OF ELECTRONIC, TECHNICAL, AND IMPERATIVE TERMS,
Feb 62, 94p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electronics, Dictionaries), (*Dictionaries, Electronics), Navy, Military publications, Naval training, Vocabulary.

Part I represents a selection of imperative terms (i.e., command verbs) as found at the beginning of each practical factor in the manual, omitting only those whose meanings are so obvious as to require no explanation. Part II contains a selection of electronic and technical terms from various ratings in the manual. Only those technical terms which seemed least familiar were defined, but the growing demand for a reference in electronics compelled the inclusion of nearly all terms in this area. The reader should be apprised that the results, insofar as they represent a consensus of a variety of sources, are tentative.

AD-606 951 Div. 8
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
POLARIZATION TECHNIQUES AND COMPONENTS FOR RADAR AND COMMUNICATION SYSTEMS.
Interim rept.
by P. J. Allen and R. D. Tompkins. 30 Jul 64, 22p
Proj. RF001 02 41 4005
NRL 6099

Unclassified report

Presented at the 1963 Northeast Electronics Research and Engineering Meeting, Boston, Mass., Nov 63.
A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Radio waves, Polarization), (*Radar signals, Polarization), (*Polarization, Electromagnetic waves), Communication systems, Microwave frequency, Propagation, Antennas, Transducers, Microwave equipment, Theory.

The incorporation of polarization diversity in future radar and communication systems is considered. The advantages of using dual circularly polarized antennas for functional control of polarization is emphasized. Applications of polarization techniques are developed into a powerful method of evaluating axial ratio characteristics of antennas. A novel continuous phase shifter is developed which illustrates the use of circular polarization to achieve efficient frequency translation.

AD-606 954 Div. 8, 26
OTS Prices: HC $3.00/MF $0.75

International Resistance Co., Philadelphia, Pa.
PRODUCTION ENGINEERING MEASURES FOR HIGH RELIABILITY, FIXED, FILM, PRECISION RESISTORS.
Quarterly progress rept. no. 6, 1 Apr-30 Jun 64,
by Richard C. Wagner. 30 Jun 64, 97p
Contract DA36 039AMC01461E

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.
Also see AD-601 628

Descriptors: (*Fixed resistors, Metal films), (*Resistors, Manufacturing methods), Production, Quality control, Reliability (Electronics), Glass seals, Electrodes, Silicon compounds, Monoxides, Coatings, Protective treatments, Thickness, Resistance (Electrical), Statistical data, Tests.

Termination width experiments were completed and the units manufactured were classified into wide or narrow termination groups. These groups were compared against a control by life and stress testing. Glass sealing techniques were modified from a 2 to a 4 electrode system. The thickness of silicon monoxide protective coatings was evaluated and no detrimental effects were found. An automatic binner was designed to bin 3,000 pieces per hour. Two new external coatings were established which contain no pigment.

AD-606 958 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Hi-Q Div., Aerovox Corp., Olean, N. Y.
PRODUCTION ENGINEERING MEASURE FOR ROLLED CERAMIC CAPACITORS.

REGENERATIVE TRANSDUCER.
Final rept., pt. 2,
by Robert D. Weaver. 30 Jun 64, 108p
Contract DA33 008ORD2335T, Proj. 518 01 001
Unclassified report

Descriptors: (*Fuel cells, Design), (*Thermoelectricity, Transducers), (*Transducers, Thermoelectricity), Iodium, Chlorine, Voltage, Electrodes, Electrochemistry, Alkali metals, Halogens, Containers, Corrosion, Metals, Alloys, Tungsten, Ceramic coatings, Glass, Protective treatments, Performance (Engineering), Temperature, Feasibility studies, Electrolytes, Electrical properties, Power supplies, Spacecraft, Bonding.

Laboratory cells, utilizing sodium and chlorine as reactants, have been assembled and tested. They were shown to produce theoretical voltages over a temperature range of 825C to 1219C and were capable of being discharged at more than 20 amperes per square inch of electrode area. They were charged and discharged and exhibited electrochemical reversibility. Studies of protective coatings for cell container materials were made. A cell of more advanced design leading toward a prototype cell was engineered and assembled and tested. This work is evaluated in terms of practical feasibility of the Electrothermally Regenerative Transducer and a fuel cell battery based on the alkali metals and the halogens as reactants. (Author)

AD-607 296 Div. 7
OTS Prices: HC $1.00/MF $0.50

Mallory (P. R.) and Co., Inc., Burlington, Mass.
CELL EQUALIZATION TECHNIQUES.
Quarterly technical progress rept. for 1 Jul-1 Oct 64,
by F. J. Cocca. 15 Oct 64, 24p
Contract AF33 615 1342
Unclassified report

Descriptors: (*Electrolytic cells, Control systems), (*Batteries and components, Stabilization systems), Nickel, Cadmium, Voltage, Electric currents, Electric discharges, Diodes, Hermetic seals, Tables.

Hermetically sealed Ni-Cd cells were cycled for the first time with stabistor charge control. The capacity range used was 5 to 20 ampere-hours. Four charge control circuits BCC-9, BCC-10, BCC-11 and BCC-12 were cycled with and without stabistor protection. In all the circuits the stabistors were effective in clamping cell voltages and minimizing gassing. In BCC-11, 20 AH Ni-Cd cells were cycled and the stabistors were effective in preventing catastrophic failures. Some antireversal studies were conducted during this period. Initial results indicate that antireversal diodes are partially successful in preventing gassing during cell reversal. The data suggest the use of a larger antireversal diode for adequate protection. (Author)

AD-607 400 Div. 7
OTS Prices: HC $5.00/MF $1.00

General Electric Co., Schenectady, N. Y.
THERMIONIC CONVERTER RESEARCH STUDIES.
Final rept. for Mar 61-Oct 64,
by J. M. Houston and H. F. Webster. Oct 64, 156p
Contract AF19 604 8424, Proj. 8659, Task 865902
AFCRL 64 409
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Thermionic converters, Reports), Thermionic emission, Performance (Engineering), Cesium, Vapors, Electrodes, Heat-resistant metals and alloys, Work functions, Single crystals, Crystals, Alkali metals, Thorium alloys, Tungsten alloys, Electron bombardment, Pyrometers, Ionic current.

The work accomplished covered research studies of a cesium thermionic converter incorporating a thorium dispenser cathode, studies of electrode materials both polycrystalline and single crystal, and the development of research techniques associated with the thermionic converters. (Author)

Descriptors: (*Magnetrons, Manufacturing methods), K band, Performance (Engineering), Temperature, Life expectancy, Anodes (Electron tubes), Quality control, Design, Thermal properties.

During this report period, eight model tubes were built and evaluated. Extensive investigations were performed to determine the cause of poor high frequency operation on current model tubes. The area of difficulty seems to be in anode mode competition but this has not yet been fully substantiated. An improved thermal design tube has been built which meets all of the temperature requirements. (Author)

AD-606 981 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Brown Univ., Providence, R. I.
WAVEGUIDE ANALOGIES OF SCATTERING AND PROPAGATION IN INHOMOGENEOUS PLASMA.
Rept. no. 4,
by Lewis Wetzel and Leonard G. Cohen. Jul 64, 35p
Contracts Norn562 35, AF19 628 2498
Unclassified report

Descriptors: (*Wave transmission, Plasma physics), (*Plasma physics, Waveguides), (*Waveguides, Analog systems), Propagation, Scattering, Electromagnetic wave reflections, Electric fields, Equations, Functions, Dielectrics, Theory, Taper, Models(Simulations).

The conditions under which dominant mode propagation in a lossless tapered waveguide may serve as an analogue of plane-wave propagation in a lossless inhomogeneous plasma are found. These conditions are relatively mild, thereby permitting a suitably tapered waveguide to be used as an analogue computer for the determination of both field distributions and the reflection and transmission coefficients for plasma distributions having fairly arbitrary density profiles. The analogy is demonstrated by an experimental determination of the reflection coefficient for a linear plasma profile. Analogies based on the use of an inhomogeneous dielectric in a uniform waveguide are discussed briefly. It is found that such analogies are suitable for measurements only at a single frequency and are therefore of limited practical utility. (Author)

AD-606 988 Div. 8
OTS Prices: HC $4.00/MF $0.75

Cruft Lab., Harvard Univ., Cambridge, Mass.
A UNIFICATION OF ANTENNA THEORY AND WAVE THEORY: INFINITE YAGI-UDA ARRAYS,
by Robert J. Mailloux. 22 Jun 64, 111p
Cruft-TR-451
Contract Nonr1866 32; Grant NSF GP851, Proj. NR371 016
Unclassified report

Partly sponsored by the U. S. Army Research Office and the U. S. Air Force Office of Scientific Research under the Joint Services Electronics Program.

Descriptors: (*Yagi antennas, Wave transmission), (*Wave transmission, Equations), (*Phased arrays, Yagi antennas), Integral equations, Electromagnetic waves, Antennas, Dipole antennas, Electric fields, Magnetic fields, Functions, Geometry, Propagation, Antenna configurations, Theory.

An integral equation for the propagation constant along an infinitely long Yagi structure is derived by expanding the vector potential function for such an array in terms of the spatial harmonic solutions of wave theory. This equation is shown to be identical with the integral equation derived on the basis of array theory and transformed by the Poisson summation formula. With the identity of array theory and this new wave-theory formulation established, the wave theory is used to discuss allowed wave solutions, pass and stop bands, and the physical characteristics required of dipoles in order that they support a wave solution. An asymptotic evaluation of electric and magnetic fields is obtained. The problem of two parallel nonstaggered Yagi arrays is considered, and it is shown that the propagation constant of the composite structure either decreases or increases over that of the isolated array depending upon whether the symmetric or the antisymmetric mode is excited. The problem of two collinear Yagi arrays is formulated and conditions are found under which a current distribution which is symmetrical about the center of each dipole may be assumed.

AD-606 990 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

McCoy Electronics Co., Mount Holly Springs, Pa.
INDUSTRIAL PREPAREDNESS MEASURE: MANUFACTURE OF GLASS HOLDER CRYSTAL UNITS
CR-(XM-17)/U.
Quarterly progress rept. no. 9, 1 Jan-31 Mar 63.
31 Mar 63, 20p
Contract DA36 039SC81269
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Crystal holders, Manufacturing methods), (*Quartz resonators, Production), Environment tests, Aging (Materials), Performance (Engineering), Glass seals, Crystals, Frequency shift, Resistance (Electrical), High frequency.

This report discusses and indicates frequency and resistance changes encountered in evacuating and sealing the glass holder. In addition, the results obtained in performing various environmental tests are presented. (Author)

AD-606 991 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

McCoy Electronics Co., Mount Holly Springs, Pa.
INDUSTRIAL PREPAREDNESS MEASURE: MANUFACTURE OF GLASS HOLDER CRYSTAL UNITS
CR-(XM-17)/U.
Quarterly progress rept. no. 10, 1 Apr-30 Jun 63.
30 Jun 63, 36p
Contract DA36 039SC81269
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Crystal holders, Manufacturing methods), (*Quartz resonators, Production), Specifications, Environmental tests, Aging (Materials), Medium frequency, Design, Processing, Performance (Engineering), Glass, Resistance (Electrial), Frequency shift.

This report discusses tentative plans to submit preproduction units for approval purposes. Included is a detailed description of the glass holder specifications with inspection and preparation procedures outlined. (Author)

Quarterly rept. no. 12, 9 Mar-9 Jun 64,
by M. J. Shoemaker. 9 Jun 64, 16p
Contract DA36 039sc85963

Unclassified report

See also AD-603 132.

Descriptors: (*Ceramic capacitors, Manufacturing methods), Ceramic materials, Capacitors, Design, Machines, Furnaces, Tests, Failure (Mechanics), Vibration, Production.

The balance of the pilot run lots was completed and turned over to the government inspector. One group of the 0.1 mfd units did not pass T. C. A new group to replace these was made and submitted. The 1.0 mfd group failed temperature and immersion cycling, two more failures than allowable, probably due to improper waxing cycle. The 2.2 mfd units exhibited three broken leads after low frequency vibration. Apparently this unit is much too heavy to be vibrated without clamping the unit. Breakage was on the wire itself. (Author)

AD-606 976 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

University of Southern California, Los Angeles, Engineering Center.
INTERACTION OF MICROWAVES WITH AN INHOMOGENEOUS AND ANISOTROPIC PLASMA COLUMN,
by C. Yeh and W. V. T. Rusch. May 64, 45p
USCEC-82-218; USCEC-EE-38
Contract AF19 604 6195, Proj. 4642, Task 464202
AFCRL 64 480

Unclassified report

Descriptors: (*Wave transmission, Plasma physics), (*Microwaves, Plasma physics), (*Plasma physics, Microwaves), Electromagnetic waves, Magnetic fields, Gas ionization, Magnetohydrodynamics, Plasma oscillations, Scattering, Electron density, Electric fields, Distribution, Equations, Discharge tubes, Theory.

The problem of the interaction of microwaves with a radially inhomogeneous plasma column confined by an impressed axial static magnetic field is treated analytically. Extensive numerical results for the backscattering cross sections are presented for various interesting ranges of the parameters involved. It is found that the often used homogeneous model for interpretation of experimental data can sometimes lead to ambiguous results. This ambiguity arises because of the interdependence of the average plasma frequency, the gyro-frequency and the inhomogeneity of the plasma density distribution. Further measurements are suggested to distinguish these effects. (Author)

AD-606 977 Div. 8
OTS Prices: HC $4.00/MF $0.75

Microwave Associates, Inc., Burlington, Mass.
APPLIED RESEARCH ON METHODS OF COUPLING TO ELECTROMAGNETIC WAVES IN PLASMA AMPLIFIERS.
Final engineering rept.,
by K. K. Chow. 6 Oct 64, 112p
Contract AF33 657 8984, Proj. 4156, Task 415603
AL TDR64 150

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Microwave amplifiers, Coupling circuits), (*Plasma medium, Electron beams), (*Electron beams, Plasma medium), Electron guns, Waveguides, Theory, Feasibility studies, Test equipment, Cyclotron waves, Magnetic fields, Alignment.

The report contains the findings of a feasibility study of directly coupling microwave power to beam-plasma interaction systems without the use of slow wave circuits. Direct coupling is an essential step towards fully utilizing the advantages of beam plasma interaction since conventional slow wave couplers restrict the power handling capabilities and the ease of device fabrication. Theoretical work performed indicates that such coupling is possible by using a long modulation space fed by smooth waveguide. Experimental data give qualitative demonstration of this coupling. Further investigation is recommended and other different approaches are also discussed. (Author)

AD-606 978 Div. 8, 30
OTS Prices: HC $3.00/MF $0.75

Central Radio Propagation Lab., National Bureau of Standards, Boulder, Colo.
FIELD STRENGTH MEASUREMENTS, PHASE I.
Final rept.,
by A. C. Stewart, E. L. Kilpatrick, and C. C. Watterson.
5 Aug 64, 81p
Contract AF30 602 2385, Proj. 4540, Task 45400
RADC TDR64 106

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Radio fields, Measuring devices (Electrical and Electronic)), (Measuring devices (Electrical and Electronic), Radio fields), Electromagnetic waves, Multipath transmission, High frequency, Radio waves, Intensity, Measurement, Antennas.

The program included the testing and evaluation of commercial and military field-strength meters. It also included a study of the interpretation of field-strength measurement data taken under multipath conditions. As part of the field-strength meter evaluation, five instruments, the AN/TRM-7, NF-105, NF-112, FIM-B2, and the NM-30A were laboratory tested and the results have been previously reported. One of the difficulties in the interpretation of the measured data is the variability of field-strength values obtained over an area. Such variability is caused by the presence of multipath components. The principle of aperture-synthesis has been applied to this problem by Watterson. Using field-strength values measured over an area, the contributions of the individual components to the field can be identified. A computer program was prepared to make the necessary computations. The principle was verified first by simulated field data and then experimentally. The results of the program verify the usefulness of the asperture-synthesis technique for the measurement of multi-component fields. (Author)

AD-606 979 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

SFD Labs., Inc., Union, N. J.
PRODUCTION ENGINEERING MEASURE FOR A Ka-BAND INVERTED COAXIAL MAGNETRON.
Quarterly progress rept. no. 5, 7 May-6 Aug 64,
by P. du Fosse and G. Glenfield. 6 Aug 64, 35p
SFD-29-QPR-5
Contract DA36 039AMC01472E

Unclassified report

Interim development rept. no. 15, 1-30 Sep 64.
15 Oct 64, 12p
Contract NObsr89536, Proj. SF0100201, Task 9294
Unclassified report

Descriptors: (*Frequency converters, Microwave frequency), Design, C band, L band, S band, X band, Diodes (Semiconductor), Klystrons, Coaxial cables, Crystal holders, Noise (Radio), Crystals, Bandwidth, Oscillators.

A second L-band double-balanced converter was fabricated as a step toward establishing a final manufacturable design. Some problems of mechanical stability were encountered, but the results indicate that the characteristics of the initial unit can be satisfactorily reproduced. The noise figure of this unit was measured at 12 db; three db within the specified limit. An S-band double-balanced converter, based on the same design approach as that used in the L-band unit, was fabricated and tested. Except for minor deviations, it meets the conversion loss and VSWR requirements in both S- and K-band. The development of double-balanced converters for X- and C-bands is being conducted in parallel. Serious difficulty has been experienced, but the most recent results are encouraging. The central problem is to meet the 3:1 VSWR specification over the C- and X-bands. Plans for the manufacture of forty deliverable frequency converters are being formulated. (Author)

AD-607 058 Div. 8
OTS Prices: HC $6.00/MF $1.25

Litton Industries, San Carlos, Calif.
HIGH-POWER CROSSED-FIELD AMPLIFIER.
Final technical documentary rept.,
by Joseph F. Hull. Jul 64, 227p Litton-793
Contract AF33 616 6493, Proj. 4156, Task 415603
ASD TDR63 793
Unclassified report

Descriptors: (*Microwave amplifiers, Crossed field devices), (*Crossed field devices, Microwave amplifiers), X-band, Amplifiers, Design, Waveguides, Gain, Radio-frequency power, Specifications, Feasibility studies.

This report contains a summary of a two phase program for the development of an X-band crossed-field amplifier. The program was initiated with a feasibility study and later resulted in the development of a 1 kw X-band tube. The feasibility portion of the program was primarily concerned with computer studies leading to the electrical design of the tube. It was determined that the requirements could be met with an injected-beam tube and did not require the addition of a distributed-emission section. During the developmental portion of the program, circular format tubes were built to meet a rigorous specification. In general, these developmental tubes had adequate power output but were limited in gain and bandwidth. They also had a tendency to oscillate because of rf feedback within the tube envelope. It was determined that higher gain and higher bandwidth with stability could be achieved only with linear format tubes.

AD-607 061 Div. 8
OTS Prices: HC $2.00/MF$0.50

General Electric Co., Irmo, S. C.
SOLID ELECTROLYTE TANTALUM FOIL CAPACITOR.
Quarterly research and development rept. for
29 Jun-28 Sep 64,
by A. L. Jenny. 28 Sep 64, 49p
Contract NObsr89380, Proj. SR0080303, Task 9636
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Tantalum capacitors, Manufacturing methods), (*Foils, Tantalum capacitors), Heat treatment, Voltage, Tantalum, Chemical milling, Anodes, Electrical properties, Aging (Materials), Dielectric properties, Electrolytes, Electrolytic capacitors, Semiconductors, Impurities, Aluminum compounds, Oxides, Capacitance, Manganese compounds, Nitrates, Life expectancy, Performance (Engineering).

Progress is reported on the development of 150 and 250 volt devices capable of full voltage operation at 85C, with design objectives for the electrical and environmental parameters as listed herein or in Military Specification MIL-C-26655A. (Author)

AD-607 071 Div. 8, 20, 25
OTS Prices: HC $4.00/MF $1.00

Dewey (G. C.) Corp., New York.
AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF RADIATION OF THE PROPOGATION OF ELECTRO-MAGNETIC SIGNALS IN AIR.
Annual technical rept. for 1 Jul 63-30 Jun 64,
by M. N. Hirsh, P. N. Eisner, and J. A. Slevin.
30 Jun 64, 133p Dewey-R-173-4
Contract DA36 039AMC03278E
Unclassified report

See also AD-603 770.

Descriptors: (*Wave transmission, Plasma physics), (*Plasma physics, Wave transmission), (*Electron density, Gas ionization), Resonance, Nitrogen, Oxygen, Electrons, Van De Graaff generators, Ions, Measurement, Mass spectroscopy, Spectrum analyzers, Propagation.

Steady-state and afterglow measurements of electron densities have been made in O2 - N2 mixtures weakly ionized by a spatially uniform flux of 1.5 Mev electrons from a Van de Graff accelerator. The plasma is contained in a large uhf resonant cavity to which mass and optical spectrometers are appended; electron densities are deduced from measured shifts in the resonant frequency of the cavity.

AD-607 081 Div. 8, 25
OTS Prices: HC $5.00/MF $1.00

Electrical Engineering Research Lab., Cornell Univ., Ithaca, N.Y.
REVIEW OF A RESEARCH EFFORT IN ACTIVE NETWORK THEORY.
Interim rept.,
by N. DeClaris and S. K. Mitra. Aug 64, 164p
Contract AF33 657 10682, Proj. 7031, Task 703103
AL TDR64 180
Unclassified report

Descriptors: (*Electrical networks, Theory), Functions, Synthesis, Tunnel diodes, Electrical impedance, Mathematical logic, Matrix algebra, Polynomials, Circuits.

A research effort in Active Network Theory is described. The work includes tasks directed to the realization of active network functions and the applications of certain algebraic mathematical techniques to network theory. These studies concern (1) transfer function synthesis using tunnel diodes as active elements, (2) synthesis of transfer functions using nonideal negative impedance converters as the active devices, (3) construction of a network function from its specified even(odd) part,

AD-606 992 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

McCoy Electronics Co., Mount Holly Springs, Pa.
INDUSTRIAL PREPAREDNESS MEASURE: MANUFACTURE OF GLASS HOLDER CRUSTAL UNITS CR(XM-17)/U.
Quarterly progress rept. no. 11, 1 Jan-31 Mar 64.
31 Mar 64, 24p
Contract DA36 039SC81269
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Crystal holders, Manufacturing methods), (*Quartz resonators, Production), Specifications, Aging (Materials), Medium frequency, High frequency, Crystals, Processing, Performance (Engineering).

This report discusses pilot run planning and presents final specifications for each requirement. Aging data obtained in testing sixty units is also presented revealing compliance with specifications. (Author)

AD-607 014 Div. 8, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PARAMETER ESTIMATION FOR WAVEFORMS IN ADDITIVE GAUSSIAN NOISE,
by P. Swerling. 25 Aug 58, 27p P-1468
Unclassified report

Descriptors: (*Communication theory, Numerical methods and procedures), (*Numerical methods and procedures, Communication theory), Noise (Radio), Stochastic processes, Analysis of variance, Functions.

A method is developed for computing the greatest lower bound for the variance of unbiased estimates of waveform parameters, when the waveform is observed in additive Gaussian noise. The greatest lower bound is approximately evaluated in several illustrative cases. The waveform parameters occurring in these examples are amplitude, time delay, and doppler shift. (Author)

AD-607 030 Div. 8
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A DIGITAL SIMULATION FOR THE PROPAGATION OF ELECTROMAGNETIC ENERGY THROUGH A STRATIFIED MEDIUM.
Master's thesis,
by Walter S. Greenwood, Jr. Aug 64, 87p
AFIT GA/EE/64 4
Unclassified report

Descriptors: (*Atmosphere models, Wave transmission), (*Wave transmission, Mathematical models), Electromagnetic waves, Propagation, Dielectrics, Radio transmission, Digital computers, Equations, Refractive index, Simulation.

A mathematical model describing the propagation of electromagnetic energy through a stratified medium is developed. Applied to atmospheric conditions, it simulates propagation through atmospheric ducts. The final program used in the digital computer solution is given. Seven refractive index profiles representing normal, substandard, and superstandard conditions comprise the data. The results are valid within the area covered by the profile. Reflections from the earth's surface are omitted. The critical angle condition, constant phase fronts, and energy distribution are discussed. The results are presented as ray tracing diagrams and energy distribution diagrams. (Author)

AD-607 035 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
EXPERIMENTAL INVESTIGATION OF CURRENT LIMITING AND OSCILLATION IN CdS.
Master's thesis,
by David R. Garner and Quentin A. Kuttenkuler.
Aug 64, 77p
AFIT GE/EE/64 9
Unclassified report

Descriptors: (*Cadmium compounds, Sulfides), (*Single crystals, Oscillation), Limiters, Electric currents, Ultrasonic radiation, Amplifiers, Pulse generators, Semiconductors.

The current limiting and oscillations which occur when low resistivity CdS is subjected to high level voltage pulses are experimentally investigated, and several theories proposed to explain the phenomena. The manufacture of the test samples and the design of a pulse generator utilizing a lumped element delay line and a silcon controlled rectifier are described. From the experimental results, a dependence of the frequency and amplitude of the oscillations on the applied voltage is shown. The theory which best explains the phenomena is found to be the transfer of electronic momentum. (Author)

AD-607 042 Div. 8
OTS Prices: HC $3.00/MF $0.50

General Electric Co., Schenectady, N. Y.
ULTRA HIGH POWER TRANSMISSION LINE TECHNIQUES.
Quarterly progress rept. no. 4, 1 Jan-31 Mar 64,
by John P. Quine. Aug 64, 51p
Contract AF30 602 2990, Proj. 5573, Task 557301
RADC TDR64 277
Unclassified report

See also AD-601 568.

Descriptors: (*Transmission lines, Waveguides), (*Waveguides, Design), Optimization, Attenuation, Radiofrequency power, Microwaves, Rectangular bodies, Waveguide couplers, Tapers, Feasibility studies.

The purpose of this investigation is to develop systematic procedures for selecting optimum waveguide configurations and designing waveguide components that will operate at high levels of peak and average power in the frequency range 1-10 gigacycles. In particular, the feasibility will be investigated of designing compact components such as bends, couplers, power dividers, tapers, and mode absorbers in waveguides having cross section dimensions in the range 1.5 to 2.5 free space wavelengths. In the report further analysis and calculations are presented for tapers and directional couplers for oversized rectangular waveguide. (Author)

AD-607 049 Div. 8
OTS Prices: HC $1.00/MF$0.50

Electromagnetic Technology Corp., Palo Alto, Calif.
FREQUENCY CONVERTER UNITS FOR L-BAND, S-BAND, C-BAND, AND X-BAND.

31 Mar 64, 58p
Contract DA36 039SC86734

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Variable resistors, Manufacturing methods), Metal films, Resistance (Electrical), Failure (Mechanics), Life expectancy, Performance (Engineering), Military requirements.

The pre-production testing of 50 K, 200 K and 200 Ohm trimmers has been discontinued due to failures of a disqualifying nature. The major failure mode has been found for the 50 K and 200 K spiral units and corrective action taken. The failure mode for the 200 Ohms toroids has been localized and corrective action will be taken on specific parts when the faults are localized.

AD-607 132 Div. 8
OTS Prices: HC $5.00/MF $1.00

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
A 35 GIGACYCLE BUNCHING ACCELERATOR FOR ELECTRONS,
by William E. Kunz. Sep 64, 169p
Contract AF33 657 10224, Proj. 4156, Task 415604
AL TDR64 214

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electron accelerators, K band), Linear accelerators, Radiofrequency power, Electron beams, Electron guns, Microwaves, Velocity, Attenuation, Magnetrons, Waveguides, Disks, Mathematical analysis, Electromagnetic fields.

A 35 gigacycle linear bunching accelerator which has a non-uniform, disk-loaded waveguide as an accelerating structure is described. An accelerator which theoretically requires 75 kilowatts of pulsed 35 Gc microwave power to accelerate a 20 milliampere beam to a velocity of 0.776c has been designed and constructed. The attenuation of and the power flow in the non-uniform structure are analyzed. Fabrication techniques for construction of the disk-loaded waveguide are described. The measured output velocity of the electrons is within one per cent of the theoretical value. A design for an accelerator which requires 125 kilowatts of pulsed 35 Gc microwave power to produce a 20 milliampere beam with a velocity of 0.9c is presented and is shown to be quite feasible. (Author)

AD-607 143 Div. 8
OTS Prices: HC $4.00/MF $1.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATIONS IN THE AREA OF RADIOTECHNICAL MEASUREMENTS: COLLECTION OF ARTICLES,
31 Aug 64, 133p
FTD MT64 06, TT 64 71536

Unclassified report

Edited machine trans. of Komitet Standartov. Mer i Izmeritel'nykh Priborov.Trudy Institutov Komiteta (USSR) 1962, no. 65(125) p. 1-85.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Measuring devices (Electrical and Electronic), Radiofrequency), (*Radio equipment, Test equipment), Transmission lines, Power meters, Thermistors, Meters, Galvanometers, Semiconductor devices, Voltmeters, Diodes(Semiconductor), Electromagnetic pulses, Bessel functions, Interference analyzers, Coaxial cables, Transformers, Capacitors, Dielectrics, Resonators, USSR.

AD-607 160 Div. 8, 6, 25, 30
OTS Prices: HC $1.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 4. RADAR.
Quarterly progress rept. for 1 Jun-31 Aug 64.
15 Sep 64, 24p
Contract AF19 628 500
ESD TDR64 373

Unclassified report

Descriptors: (*Radar, Scientific research), Radar signals, Instrumentation, Radar equipment, Radar antennas, Radar tracking, Radar transmitters, Phased arrays, Waveguides, Multiple beam antennas, Frequency, Radio astronomy, Ranges (Distance), Measurement, Microwave equipment, Solid state physics, Surface properties, Parametric amplifiers, Transistors, Electronics.

Research activities in the field of radar are presented. Subject-fields include; radar signal processing, transmitters, array radars, range measurements, and microwave components.

AD-607 161 Div. 8
OTS Prices: HC $2.00/MF $0.50

American Inst. for Research, Pittsburgh, Pa.
AN INDEX OF ELECTRONIC EQUIPMENT OPERABILITY: DATA STORE,
by Sara J. Munger, Robert W. Smith, and Dan Payne.
31 Jan 62, 50p AIR-C43-1/62-RP(1)
Contract DA36-039SC80555

Unclassified report

Descriptors: (*Electronic equipment, Indexes), Operation, Data, Reliability, Identification systems.

The Data Store contains the time and operator reliability data to be used with the Index of Electronic Equipment Operability.

AD-607 163 Div. 8
OTS Prices: HC $5.00/MF $1.00

American Inst. for Research, Pittsburgh, Pa.
AN INDEX OF ELECTRONIC EQUIPMENT OPERABILITY: SAMPLE EQUIPMENT EVALUATIONS,
by Robert W. Smith and Dan Payne. 31 Jan 62,
158p AIR-C-43-1/62-RP(4)
Contract DA36 039SC80555

Unclassified report

Descriptors: (*Electronic equipment, Indexes), (*Indexes, Feasibility studies), Operation, Tables, Identification systems, Time.

The document contains evaluation reports on the four equipments evaluated during the tryout of the Index. The primary purpose of the tryout was to assess the Index,

(4) driving-point function realization based on a polynomial decomposition approach, and (5) compatibility of impedance matrices of active multiports. The individual research tasks and the significant original technical contributions which resulted were reviewed, and a list of all publications completed during this period was given. Three tasks were reported in detail in the appendices. (Author)

AD-607 090 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Chalmers Univ. of Tech., Gothenburg (Sweden).
DYNAMIC NON-LINEAR WAVE PROPAGATION IN IONIZED MEDIA. 12. ELECTROMAGNETIC WAVE FROM AN OSCILLATING, COLLISION FREE MAGNETO-IONIC MEDIUM,
by O. E. H. Rydbeck. 1Jul 64, 60p
CUT-RR-43, CUT-US-37
Contract AF61 052 451
AFCRL 64 672

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electromagnetic wave reflections, Plasma physics), (*Plasma physics, Electromagnetic wave reflections), Electron density Ionospheric propagation, Gas ionization, Electromagnetic waves, Propagation, Resonance, Equations, Mathematical models.

Electromagnetic wave reflection from an oscillating, (e.g., pumped) magneto-ionic medium is treated in detail, also for the slowly inhomogeneous medium, on the basic of the non-linear magneto-ionic theory earlier developed by O.E.H. Rydbeck. The various reflection and refraction laws for the mixed frequency components, and the radiation for the same is discussed in the report. It is also shown that one can make use of non-linear resonance effects to echo sound the ionosphere at mixed frequencies (in the 25 Mc/s range) to obtain the true height of reflection (at the difference frequency) and the electron density gradient. Pulse powers of the order of 5 MW would have to be used for the purpose. (Author)

AD-607 091 Div. 8
OTS Prices: HC $4.00/MF $1.00

Chalmers Univ. of Tech., Gothenburg (Sweden).
RESEARCH IN THE FIELD OF PROPAGATION OF HIGH POWER WAVES IN IONIZED MEDIA.
Rept. for 1 Oct 60-31 Mar 64,
by O. E. H. Rydbeck. 1 Jul 64, 132p
CUT-RR-48; CUT-US-42
Contract AF61 052 451
AFCRL 64 670

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radiowaves, Propagation), (*Wave transmission, Radio waves), High frequency, Electromagnetic waves, Plasma physics.

In this report a survey is given of the research in the field of propagation of high power radio waves in ionized media, and allied fields, carried out by the staff of the Research Laboratory of Electronics 1960-1964. The investigations reported cover such aspects as the development of a non-linear magneto-ionic theory, generation and radiation of mixed frequency waves in ionized media, artificial heating of the F-region of the ionosphere, scattering of electromagnetic waves by oscillating, anisotropic dielectric and ionized media, ionized stream-whistler mode interactions (in the exosphere), and wave propagation properties of moving ionized media.

AD-607 093 Div. 8
OTS Prices: HC $1.00/MF $0.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
THE THEORY OF COIL ANTENNAS,
by Trilochan Padhi. 1 Jul 64, 20p Cruft-TR-442
Contract Nonr1866 26, Proj. NR371 015

Unclassified report

Partly supported by the Sandia Corp., Albuquerque, N. Mex.

Descriptors: (*Loop antennas, Theory), (*Coils, Antennas), Distribution, Admittance, Electric currents, Potential theory, Fourier analysis, Series, Sequences.

In this report, a method was presented by which the distribution of current on some structurally simple coil or multiturn loop antennas may be obtained. The input admittances of unshielded and shielded coils were determined and their operation as receiving elements was considered. (Author)

AD-607 094 Div. 8
OTS Prices: HC $2.00/MF $0.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
JOINT OPTIMIZATION OF TRANSMITTER AND RECEIVER IN PULSE AMPLITUDE MODULATION,
by Donald W. Tufts and David A. Shnidman.
14 Jul 64, 28p Cruft-TR-444
Contract Nonr1866 16, Proj. NR372 012

Unclassified report

Also supported in part by the U.S. Army Research Office and the U.S. Air Force Office of Scientific Research under the Joint Services Electronics Program.

Descriptors: (*Communication theory, Pulse communication systems), (*Pulse communication systems, Optimization), (*Optimization, Communication theory), Mathematical models, Pulse modulation, Amplitude modulation, Noise(Radio), Radio interference, Pulse transmitters, Radio receivers, Radiofrequency filters, Real numbers, Equations, Integral transforms, Fourier analysis, Series, Probability.

Jointly optimum transmitted waveforms and linear time-varying receivers are specified for Pulse Amplitude Modulation systems which are subject to two kinds of interference, noise and intersymbol interference. The mean-square error in the receiver's reproduction of the random message sequence is used as our performance criterion. The joint optimization is carried out in detail for the case of signaling through a noisy RC filter. Special emphasis is placed on the empirical exploration of performance variations caused by different choices of the message correlation matrix. (Author)

AD-607 096 Div. 8, 26
OTS Prices: HC $3.00/MF $0.75

Weston Instruments, Inc., Newark, N. J.
PRODUCTION FACILITIES FOR MULTI-TURN METAL-FILM TRIMMER RESISTORS PER SIGNAL CORPS TECHNICAL REQUIREMENT SCS-127 DATED 9 FEBRUARY, 1962.
Quarterly progress rept. no. 7, 1 Jan-31 Mar 64.

AD-607 269 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
EXCITATION OF ION OSCILLATIONS IN BEAM-PLASMA SYSTEMS,
Technical rept.,
by M. T. Vlaardingerbroek. 18 Sep 64, 36p RLE-426
Contract DA36 039AMC03200E; Grant DA SIG36 039 61G14 Unclassified report

Descriptors: (*Plasma oscillations, Excitation), (*Electron beams, Plasma physics), Plasma medium, Ions, Oscillation, Waveguides, Magnetic fields, Cyclotron waves, Mathematical models, Matrix algebra, Integration, Integral equations, Microwave amplifiers.

The report suggests possible ways for further theoretical study of the interaction of an electron beam and the ions in a hot-electron plasma. Equations are obtained for beam-plasma interaction in a filled cylindrical waveguide in which the thermal velocity distribution is longitudinal but otherwise arbitrary. An approximation is described based on these equations by using only one transverse wave number. A close resemblance is found between the approximate solutions and the theory of plane waves in an infinite beam-plasma system, traveling at an angle with the direction of the beam and the magnetic field and having a certain fixed real transverse wave number. Advantage is taken of this resemblance to calculate beam- (hot-electron) plasma interaction including a transverse random velocity distribution. The theory of a filamentary beam is combined with that of a plasma-filled waveguide, using the coupling-of-modes theory, for the description of some of the weak interactions between a thin beam and a finite plasma. (Author)

AD-607 270 Div. 8, 25, 30
OTS Prices: HC $5.00/MF $1.00

Laboratory for Electronics, Inc., Boston, Mass.
RESEARCH IN FERROMAGNETICS.
Final rept. for 15 Dec 62-1 Mar 64,
by Robert J. Spain, Richard M. Hornreich, Harvey I. Jauvtis, Harrison W. Fuller, and Chi-Hsiang Lee.
1 Mar 64, 180p LFE-979-A3
Contracts AF19 604 8349, Nonr2676 00, Projs. 5632, NR048 137, Task 563207
AFCRL 64 655 Unclassified report

Descriptors: (*Ferromagnetic materials, Films), (*Thin films (Storage devices), Ferromagnetism), Crystal substructure, Anisotropy, Electronic switches, Computer logic, Circuits, Parametric amplifiers, Coils, Gain, Metal films, Computer storage devices, Display systems, Analog-to-digital converters.

A theoretical model for the calculation of the density of domain walls at remanence during hard axis switching in thin films is presented. Demagnetizing energy is taken into account, and the model predicts a point at which a 'locked-in' state will occur. An introduction to the theory and operation of thin film parametrons is presented. Three new controlled wall-motion shift register designs are described, all of which are characterized by an easy-axis direction that is perpendicular to the direction of wall propagation, resulting in the possibility of high information density and high speed of operation. Descriptions are given of: a fast thin film readout scheme, a thin film analog-to-digital converter, and a new shift register concept.

AD-607 294 Div. 8, 25, 26
OTS Prices: HC $4.00/MF $1.00

Motorola, Inc., Phoenix, Ariz.
PRODUCTION ENGINEERING MEASURE. PRODUCTION OF A SILICON PLANAR EPITAXIAL TRANSISTOR WITH A MAXIMUM OPERATING FAILURE RATE OF 0.001% PER 1000 HOURS AT A CONFIDENCE LEVEL OF 90% AT 25C.
Final engineering rept. for 1 May 62-30 Oct 63,
by W. J. Corrigan and L. E. Dwork. 30 Oct 63, 126p
Contract DA36 039SC86728E
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), (*Semiconductor devices, Silicon), Silicon, Epitaxial growth, Production, Reliability (Electronics), Gold, Aluminum, Welding, Bonding, Vapor plating, Encapsulation, Diffusion, Tests, Statistical data.

This report contains a summary of the results of the efforts expended in the Reliability Engineering area. Also contained are summaries of process change evaluation experiments, acceleration factor experiments and large scale testing. Comparisons are made of parameter distribution and stability, failure rate and mechanical ruggedness between the several processes developed during this Production Engineering Measure Program. (Author)

AD-607 297 Div. 8, 25
OTS Prices: HC $4.00/MF $0.75

Melpar Inc., Falls Church, Va.
THIN-FILM MONOTRONICS.
Quarterly rept. no. 2, 12 Jun-12 Sep 64,
by Richard C. Smith. 12 Sep 64, 119p
Contract NOw64 0568d
Unclassified report

Also see AD-602 872.

Descriptors: (*Molecular electronics, Circuits), (*Semiconducting films, Materials), (*Semiconductor devices, Manufacturing methods), Printed circuits, Integrated circuits, Dielectric films, Films, Vapor plating, Vacuum apparatus, High temperature research, Diodes (Semiconductor), Radiation damage, Triodes, Amplifiers, Intermetallic compounds, Microminiaturization (Electronics), Cadmium compounds, Selenides, Sulfides, Tellurides, Zinc alloys, Godolinium alloys, Germanium, Boron, Silicon compounds, Neodymium compounds, Dysprosium compounds.

The current emphasis in the area of materials research is on semiconducting and dielectric films for high-temperature application. Semiconducting and dielectric films are being deposited by thermal evaporation in vacuum, using resistance heating or electron-beam bombardment. The characterization of the neodymium oxide--thin dielectric film system was completed, and effort was directed toward finding another dielectric film system having not only the high-temperature electrical stability of the neodymium oxide system but also the physical stability at high temperatures which the latter system lacks. Intensive work on field-effect devices for high-temperature circuit application continues. Temperature data on cadmium selenide field-effect devices are being gathered for use in the design of the operational amplifier. Radiation-resistance studies are being conducted in accordance with the contractual requirements.

AD-607 298 Div. 8
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
HIGH FREQUENCY TECHNIQUES AND ELECTRO-ACOUSTICS (SELECTED ARTICLES).
by K. Eberhard Muller, K. Bahmann, and

and not the equipment to which it was applied. The report is presented to illustrate the kinds of evaluative comments which may be generated through use of the Index of Operability. It is not intended to be used as a formal appraisal of the equipments involved.

AD-607 164 Div. 8
OTS Prices: HC $3.00/MF $0.75

American Inst. for Research, Pittsburgh, Pa.
AN INDEX OF ELECTRONIC EQUIPMENT OPERABILITY: REPORT OF DEVELOPMENT,
by Dan Payne and James W. Altman. 31 Jan 62, 66p AIR-C-43-1/62-FR
Contract DA36 039SC80555
Unclassified report

Descriptors: (*Electronic equipment, Indexes), (*Indexes, Feasibility studies), Operation, Analysis, Maintainability, Reliability, Data.

AD-607 193 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMPATIBLE AM STEREO,
by Edward Bedrosian. Oct 64, 8p P-2989
Unclassified report

Descriptors: (*Radio broadcasting, Amplitude modulation), (*Amplitude modulation, Sidebands), Phase modulation, Communication theory, Frequency modulation, Compatibility, Radio signals, Theory, Integral transforms.

The adaption of conventional AM broadcasting to stereo by using the upper and lower sidebands to transmite the left and right channels respectively is discussed.

AD-607 231 Div. 8
OTS Prices: HC $5.00/MF $1.00

Shockley Transistor Div., Clevite Transistor, Palo Alto, Calif.
RESEARCH ON SOLID STATE NOISE DEVICES.
Annual scientific rept. no. 2, 1 Aug 63-31 Jul 64, ed. by R. H. Haitz. 31 Jul 64, 160p
Contract DA49 186ORD1086, Proj. 96395
Unclassified report

Descriptors: (*Semiconductor devices, Noise (Radio)), (*Avalanche diodes, Design), Circuits, Optimization, Field theory, Electron transitions, Silicon, Phosphorus, Vapor plating, Test methods, Manufacturing methods, Electromagnetic pulses, Optical phenomena.

The report is concerned with two problems: (1) the investigation of the basic mechanisms of avalanche breakdown, and (2) their application to the generation of high amplitude white noise with considerable temperature independence. Of special interest is the frequency range from 40 kc to 200 kc. The design considerations for a noise diode with a low avalanche pulse rate of the order of 10,000/sec 1 are discussed. To obtain a low temperature dependence of the noise output the diode is designed such that the avalanche pulse rate is determined by carriers generated by band-to-band tunneling rather than by thermal generation from generation and trapping centers. Design considerations for a noise diode with an avalanche pulse rate of the order of 1,000,000/sec -1 are also discussed. The mechanisms of carrier generation within the space charge layer of a p-n junction are studied in order to optimize the diode design with respect to noise amplitude, spectral distribution and temperature dependence. An optical coupling mechanism between avalanche diodes is also investigated. (Author)

AD-607 255 Div. 8, 15
OTS Prices: HC $3.00/MF $0.75

Cruft Lab., Harvard Univ., Cambridge, Mass.
INTERACTION OF SIGNAL AND NOISE IN A NONLINEAR SYSTEM,
by P. Trafton and D. W. Tufts. 27 Jul 64, 64p
Cruft-TR-450
Contract Nonr18866 16, Proj. NR372 012
Unclassified report

Descriptors: (*Communication theory, Demodulation), (*Demodulation, Signal-to-noise ratio), Nonlinear systems, Models (Simulations), Electromagnetic pulses, Signals, Low-pass filters, Probability, Statistical functions, Sampling, Functions, Analysis of variance, Clipper circuits, Theory.

An experimental system has been constructed which simulates the detection stage of a receiver. With the application of periodic bursts of sine-wave plus Gaussian noise at the input, the output of this system is a non-stationary random process. The addition of noise to the signal suppresses the mean at the output for the half-wave linear detector. However, the mean is unchanged for the half-wave square-law detector. The non-stationary variance is seen to vary between two values which can be easily measured. Output signal-to-noise ratio is greater for the half-wave square-law device than for the half-wave linear device. Addition of a clipper to the half-wave linear device decreases the signal-to-noise ratio. Detection characteristics of the half-wave linear and half-wave square-law devices are found to be equivalent and the clipper degrades the detection characteristic. (Author)

AD-607 261 Div. 8
OTS Prices: HC $3.00/MF$0.50

Eitel-McCullough, Inc., San Carlos, Calif.
HIGH-POWER X-BAND GENERATOR.
Quarterly rept. no. 7, 1 Apr-30 Jun 64,
by William R. Luebke, Jared Leidigh, and Tore Wessel-Berg. 18 Sep 64, 54p
Contract AF30 602 2756
RADC TDR64 451
Unclassified report

Descriptors: (*Microwave amplifiers, X band), (*Klystrons, Microwave amplifiers), (*Waveguides, Design), Radiofrequency generators, Radiofrequency power, Waveguide windows, Performance (Engineering), Circuits, Radiofrequency pulses, Electron beams.

The purpose of this program is to develop a klystron amplifier operating at 8 kMc and delivering one megawatt of CW power. A long pulse tube was tested to 60 kilowatts of average power at which point catastrophic window failure occurred. A second long-pulse tube with a new window design was operated successfully for several hours at more than 200 kilowatts average and 500 kilowatts peak power output. A short pulse using extended-interaction input and penultimate cavities was built. Test results are presented. Further theoretical analysis of some large signal aspects of the excitation of extended-interaction cavities is presented. (Author)

AD-607 340 Div. 8
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
COMPONENT PACKAGING TECHNIQUES.
Semiannual rept. for 1 Jan-30 Jun 59,
by George Beck. 30 Jun 59, 43p STL/TR-59-0000-00704
Contract AF04 647 309
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Packaging, Electronics), (*Modules (Electronic), Reliability (Electronics)), (*Vibration isolators, Modules (Electronic)), Packaged circuits, Shock resistance, Vibration, Electric discharges, Transducers, Expanded plastics, Temperature, Corrosion, Thermal conductivity, Microminaturization, Welds, Electric wire, Electronic equipment.

The investigation of the dynamic absorber principle, for improved vibration protection of equipment, culminated in a new design, which represents the optimum development practical at this time. The study of random and sinusoidal vibration resulted in the installation of a tape recording system to permit spectral analysis of the vibration data. The system can record 21 channels of information simultaneously with the use of subcarrier oscillators. Statistical analysis of data, obtained in low-pressure electrical discharge experiments, showed possible deviation from Paschen's Law in the designer's favor. Work on the lightweight transducer, which is both expendable and versatile, was brought to completion. The Materials and Processes Laboratory continued experiments with various commercially available foamed-in-place plastics. Thermal transmission data were obtained, and the effects of corrosiveness on electronic materials were studied. The laboratory also began studies on microminiaturization and the state-of-the-art of electronically welded interconnections of electronic circuitry. (Author)

AD-607 346 Div. 8
OTS Prices: HC $2.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
REVIEW AND ANALYSIS OF FERRIMAGNETIC MICROWAVE PARAMETRIC AMPLIFIERS,
by Martin Auer. May 64, 40p
Task 1G6 22001A055 05 01
USAEL TR2487 Unclassified report

Descriptors: (*Parametric amplifiers, Ferrimagnetic materials), (*Ferrimagnetic materials, Parametric amplifiers), Microwave amplifiers, Solid state physics, Microwave oscillators, Magnetic fields, Electromagnetism, Gain, Bandwidth, Equations, Noise (Radio), Theory.

This report surveys the development of the ferrimagnetic parametric amplifier. The theoretical background of the amplifier is developed, taking into account the several operational diversifications. Pump power threshold, gain, bandwidth, and noise behavior are discussed. Experimental approaches relating to the different modes of operation are presented, together with the results achieved. In the concluding section, an appraisal of the ferrimagnetic parametric amplifier is made by comparison to the diode parametric amplifier and the maser. (Author)

AD-607 371 Div. 8, 25, 26
OTS Prices: HC $3.00/MF $0.75

Sylvania Electric Products Inc., Waltham, Mass.
ACTIVE THIN FILM TECHNIQUES MICROMIN PROGRAM.
Final rept. for 22 Jun 62-1 Sep 64,
by Egons Rasmanis, Rosemary Beatty, and Robert Tiernan. 30 Sep 64, 84p
Contract NObsr87633, Proj. SR008 03 03, Task 9631
Unclassified report

Descriptors: (*Microminiaturization (Electronics), Semiconductors), (*Semiconductor devices, Films), (*Silicon, Films), Diodes (Semiconductor), Transistors, Preparation, Germanium, Vapor plating, Electric insulation, Sodium compounds, Magnesium compounds, Calcium compounds, Silicon compounds, Oxides, Evaporators, Vacuum systems, Design, Crystal substructure, X-ray diffraction analysis, Electron diffraction analysis, Impurities, Heat treatment.

The purpose of the investigation was to develop a process for depositing device quality silicon and/or germanium films on glazed polycrystalline insulating substrates by vacuum evaporation of silicon and/or germanium and to form thin film diodes and transistors in these films. Deposition of device quality silicon films on substrates coated with a mixture of oxides which are fluid at the deposition temperature was specifically investigated. Development of glaze materials in the system Na_2O-MgO-CaO and SiO_2 produced materials for the formation of fluid layers on which both n and p type silicon films can be vacuum evaporated. X-ray and electron diffraction analysis have shown that rheotaxial silicon deposits have a preferred (110) orientation and they consist of aggregates of 2 microns with grains of approx. 3000A. Annealing of silicon films increased the grain sizes to 200 microns. X-ray analysis has shown an orientation shift during annealing from preferred (110) to strong (111) orientation. Doping techniques were developed and a mask changer designed making it possible to selectively vacuum deposit silicon films to the geometry and impurity profile necessary to form diodes and transistors. (Author)

AD-607 395 Div. 8
OTS Prices: HC $5.00/MF $1.00

Microwave Device and Physical Electronics Lab., Univ. of Utah, Salt Lake City.
A TEN KILOMEGACYCLE AMPLIFIER UTILIZING THE INTERACTION BETWEEN A PERIODIC ELECTRON BEAM AND AN UNLOADED WAVEGUIDE MODE.
Rept. for Jul 62-Jul 64,
by W. L. Dickson and C. C. Johnson. Sep 64, 151p
ASD-2
Contract AF33 657 8677, Proj. 4156, Task 415603
AL TDR64 192
Unclassified report

Descriptors: (*Amplifiers, Electron beams), (*Electron beams, Waveguides), (*Waveguides, Amplifiers), Magnetic fields, Magnetrons, Electron guns, Propagation, Space charges, X-band, Waveguide windows, Circuits, Gain, Mathematical analysis, Design, Electrons.

The amplifier described in this paper utilizes a waveguide as the propagating circuit. The interaction takes place between a spiraling electron beam and the dominant waveguide mode in the presence of an axial magnetic field. Desirable features of this device are high power capabilities and high frequency. A magnetron injection gun with radial electric field is used to produce a spiraling beam. The beam is passed through a discontinuity in the radial electric field and into a tapered magnetic field, resulting in a hollow beam with the individual electrons having the correct properties for interaction. An analysis is carried out describing the limiting perveance characteristics of a rotating electron beam. The amplifier is designed to operate under pulsed conditions at X-band. Theoretically gains in the order of 10 db are possible with the efficiency near 30 per cent.

Augustin Ditl. 28 Sep 64, 45p
FTD TT64 555; TT 64 71554

Unclassified report

Unedited rough draft trans. of Hochfrequenztechnik und Elektroakustik (East Germany) 1963, v. 72, no. 5, p. 155-163, 177-186.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Spiral antennas, Antenna radiation patterns), (*Antenna radiation patterns, Spiral antennas), (*Pulse modulation, Coding), (*Coding, Pulse modulation), High frequency, Electromagnetic waves, Waves transmission, Radio fields, Antennas, Communication equipment, Communication theory, East Germany, Reports.

Archimedian spiral antennas and various problems of pulse-code modulation are discussed.

AD-607 300 Div. 8
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE INADEQUACY OF THE INTEGRAL ANTENNA EQUATION,
by I. G. Klyatskin. 23 Sep 64, 9p
FTD TT64 673; TT 64 71568

Unclassified report

Unedited rougn draft trans. of Akademiya Nauk SSSR. Doklady, 1963, v. 152, no. 5, p. 1089-1091.

Descriptors: (*Integral equations, Antennas), (*Antennas, Integral equations), Reliability, Electric currents, Distribution, Antenna radiation patterns, Potential theory, Voltage, USSR.

In this work, it was shown that the 'method of induced emf' gives correct results when used to determine the distribution of current over an antenna. A real integral equation was derived for a transmitting antenna.

AD-607 320 Div. 8
OTS Prices: HC $3.00/MF $0.50

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
PATTERN-BANDWIDTH OPTIMIZATION OF THE SLEEVE MONOPOLE.
Technical rept. no. 6,
by A. J. Poggio. Oct 64, 53p RRL-258
Contract NObsr89229

Unclassified report

Descriptors: (*Omnidirectional antennas, Antenna radiation patterns), (*Antenna radiation patterns, Optimization), Antenna configurations, Broadband, Impedance matching, Standing wave ratios, Antenna feeds, Coaxial cables, Antenna lobes, Electrical properties, Equations, Bandwidth.

The effect of varying the physical dimensions of the sleeve monopole upon its electrical characteristics is predicted theoretically by analogies with uniform radius cylindrical antennas and is verified experimentally. The theory of matching networks is sufficiently developed and it is shown that an impedance matching system can be located within the sleeve structure. It is also shown that the radiation pattern can be optimized over a given band and then, by using matching networks, the VSWR can be maintained below a certain level without altering the pattern. It is made evident that, subject to the Fano criteria, the impedance bandwidth can be optimized independently of the radiation pattern. A system is designed to satisfy typical specifications and the techniques used are clearly illustrated. (Author)

AD-607 321 Div. 8
OTS Prices: HC $6.00/MF $1.50

Radiation, Inc., Melbourne, Fla.
STUDY OF SPECIAL BEAMSHAPING ANTENNAS.
Rept. no. 4 (Final), 1 Jul 63-30 Jul 64,
by R. E. Moseley, B. L. Lewis, L. Pietsch, H. E. Bartlett, and G. W. Collins. 30 Jul 64, 300p
Contract DA36 039AMC03310E, Proj. 1R3 32 101D253

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy, See also AD-429 052.

Descriptors: (*Antennas, Dielectrics), (*Antenna configurations, Design), Expanded plastics, Antenna radiation patterns, Antenna feeds, Phased arrays, Feasibility studies, Mobile, Dielectric properties, Equations, Lens antennas, Waveguides, Antenna lobes, Theory.

This report describes the investigations conducted during a program to investigate the applicability of end-fire, dielectric radiating elements in easily transportable satellite communications antenna arrays. Investigations of the applicability of these elements as primary feeds for lenses and reflectors are also described. The program has provided a new and workable theory that is applicable to a wide range of element sizes and materials and has resulted in the development of the Foamrod Antenna which has an order of magnitude greater gain than conventional end-fire dielectric elements. An Array Design Plan was written which describes an array equivalent to a thirty foot diameter parabolic antenna. For a feasibility model, a 16-element array was designed for electrical performance equivalent to a 15 foot diameter paraboloid. In the area of feeds for reflector antennas, some promising results have been obtained.

AD-607 327 Div. 8, 5
OTS Prices: HC $3.00/MF $0.75

General Electric Co., Pittsfield, Mass.
TRANSIENT SYNTHESIZER FEASIBILITY STUDY (PHASE I).
Final rept. for 5 Jun-2 Sep 64.
7 Sep 64, 73p
Contract NBy-32262, Proj. Y-F015-12-08-003

Unclassified report

Descriptors: (*Transients, Synthesis), Inverters, Waveform generators, Communication systems, Timing circuits, Voltmeters, Programming (Computers), Design, Feasibility studies, Costs.

The report covers a design study effort by General Electric to determine the various mechanical and electrical components necessary to build a transient voltage synthesizer. The synthesizer would be designed to provide variations in the frequency and amplitude of a 60 cycle wave form. The synthesizer would also superimpose a 1,000 volt spike on the wave form for testing. (Author)

9. Fluid Mechanics

AD-606 869 Div. 9, 12
OTS Prices: HC $2.00/MF $0.50

Fluid Mechanics Lab., Mass. Inst. of Tech., Cambridge.
ENTRY HEAT TRANSFER AT SUPER-ORBITAL SPEEDS,
by James A. Fay. Aug 64, 38p FML-Pub-64-7
Contract Nonr1841 93; Grant AF AFOSR353 63
AFOSR 64 1935

Unclassified report

Descriptors: (*Atmosphere entry, Aerodynamic heating), (*Heat transfer, reentry vehicles), Shock waves, Thermal radiation, Thermodynamics.

AD-606 870 Div. 9, 12
OTS Prices: HC $3.00/MF $0.75

Fluid Mechanics Lab., Mass. Inst. of Tech., Cambridge.
APPROXIMATE ANALYTICAL SOLUTION OF SIMILARITY BOUNDARY LAYER EQUATIONS WITH VARIABLE FLUID PROPERTIES,
by Nelson H. Kemp. Sep 64, 72p FML-Pub-64-6
Contract Nonr1841 93; Grant AF AFOSR353 63
AFOSR 64 1934

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Boundary layer, Fluid dynamic properties), (*Heat transfer, Integral equations), (*Shear stresses, Integral equations), Aerodynamic heating, Reentry vehicles, Mathematical analysis.

An approximate method of the integral type is developed for computing heat transfer and shear stress in similarity boundary-layer problems of single fluids with variable fluid properties. It is applied to flat-plate, stagnation-point, and shock-tube end-wall geometries. Simple analytical formulas are developed involving integrals over the fluid properties. When the corrected formulas are compared with exact solutions for power-law or combination-of-power-law fluid properties, agreement is found to within 3 to 5% for heat transfer rate and 4 to 8% for shear stress. These simple and accurate formulas may be used as correlation formulas for engineering estimates of heating and shear, or as guesses for starting the usual iterative procedure of exact solution of the similarity boundary layer equations. It is shown that a simple relation exists between the heat transfer in the stagnation-point and end-wall cases, enabling bounds on the stagnation-point heat transfer rate to be found from calculations for the simple end-wall geometry. (Author)

AD-606 873 Div. 9, 26
OTS Prices: HC $1.00/MF $0.50

Bureau of Reclamation, Denver, Colo.
HYDRAULIC STUDIES OF A SUDDEN ENLARGEMENT ENERGY DISSIPATOR USED DOWNSTREAM FROM A GATE VALVE.
by W. P. Simmons. 18 Aug 64, 22p Hyd-535

Unclassified report

Descriptors: (*Pipes, Configuration), (*Cavitation noise, Control), Pressure, Energy, Distribution, Gate valves, Hydraulic valves, Hydrodynamics, Thermodynamics, Pumps, Air, Vibration, Tanks (Containers).

Limited studies were made under high heads to determine the effectiveness of a sudden enlargement type energy dissipator used downstream from an 8-inch gate valve. The enlarged section, which started at the downstream flange of the valve, was 16 inches in diameter (2.0 D1) and 80 inches long (5.0 D2). The valve throttled at heads up to 600 feet. Discharges of 1.0, 3.0, and 5.0 cfs were tested. A back pressure, or downstream depth of water, of only 1.0 foot above the centerline of the 16-inch pipe was sufficient to maintain the enlarged pipe full and obtain satisfactory energy dissipation at all conditions tested. The water surface in the open tank just downstream from the enlargement was rough when the depth above the pipe centerline was small, but became much smoother at depths of 5 and 6 feet. Cavitation ranged from moderate to severe within the enlarged pipe. Admission of air at the extreme upstream end of the enlargement greatly reduced cavitation noise and vibration. (Author)

AD-606 880 Div. 9, 2, 12, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE COMPUTATION OF OBLIQUE SHOCK WAVE CHARACTERISTICS FOR REAL GASES,
by W. C. Strahle. Aug 61, 16p P-2436

Unclassified report

Descriptors: (*Shock waves, Planetary atmospheres), (*Planetary atmospheres, Atmosphere entry), (*Atmosphere entry, Planetary atmospheres), Atmosphere models, Mechanical waves, Gases, Hypersonic characteristics, Fluid mechanics, Numerical analysis,

A method is presented whereby oblique shock wave data for real gases may be readily obtained from real gas normal shock wave data corresponding to the same upstream thermodynamic state. Although such solutions are well known for perfect gases there appears to be no method available at this time to account for real gas effects. This method is only useful when the flow deflection angle is the specified parameter instead of the wave inclination angle. There is no restriction to any gas composition since the physics of the problem are completely contained in the normal shock characteristics. It is expected that primary use of this method will be found in the study of vehicles for entry into planetary atmospheres. Because of the present uncertainty of the characteristics of any of the planetary atmospheres it is not economically justifiable to compute oblique shock charts for every conceivable model atmosphere. However, to even begin consideration of an entry vehicle requires that some normal shock computations be made. (Author)

AD-606 886 Div. 9, 1
OTS Prices: HC $5.00/MF $1.00

Oceanics, Inc., Plainview, N.Y.
AN EXPERIMENTAL STUDY OF THE DYNAMIC AND STEADY STATE FLOW DISTURBANCES ENCOUNTERED BY AIRCRAFT DURING A CARRIER LANDING APPROACH,
by August F. Lehman. Sep 64, 168p
Oceanics-64-16
Contract Nonr4186 00

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. Limited supply on hand: when exhausted, document will be available in microfiche only.

Descriptors: (*Landings, Aerodynamic characteristics), Aircraft carriers, Fluid flow, Motion, Wake, Flow visualization, Water tunnels.

AD-607 399 Div. 8
OTS Prices: HC $2.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
APPRAISAL OF CO-SITE INTERFERENCE AND EFFICIENCY OF THE abm FREQUENCY PLAN,
by Nello R. Castellini. Jul 63, 50p
Task 1G6 20501D449 01
USAEL TR2377 Unclassified report

Descriptors: (*Radio interference, Reduction), (*Radiofrequency, Compatibility), (*Frequency, Selection), Multiplex, Wave transmission, Radio relay systems, Military requirements, Radio communication systems.

In order to be free of spurious interference, any frequency assignment whatsoever must be drawn from frequency groups, the members of which belong to the logical product of classes of frequencies defined in conjunction with the mutual interference chart (MIC). If this condition is not met, the groups contain potential interferers which, in frequency assignments, may form combinations giving rise to spurious interference. Given groups of specified size and number of interferers, and frequency assignment plans, there is a definite probability that various degrees of interference will be encountered if one or more choices of frequencies are made. These results are formally established and applied to the abm plan. This plan presupposes an MIC which consists of a swath symmetrically disposed about the main diagonal. An experimental MIC and an abm assignment were examined in the light of the theoretical results. The abm plan has the advantage of relative simplicity, but is wasteful of useful frequency combinations and provides assignments which, especially at low frequencies (in units of the intermediate frequency), are likely to contain interference.

Pressure and heat transfer data were obtained for hypersonic flows over 40-degree expansion corners and ahead of ramps. Full and partial span ramps, having wedge angles up to 90 degrees, were tested at two locations on a sharp leading edge flat plate, with and without end plates. Pressure data were obtained for M = 5 for model length Reynolds numbers between 1.1 and 6.6 million. Both pressure and heat transfer data were obtained for M = 8 for Reynolds numbers between 1.1 and 3.3 million. (Author)

AD-607 065 Div. 9
OTS Prices: HC $4.00/MF $1.00

Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
PERIODIC BOUNDARY LAYER FLOWS OVER A FLAT PLATE,
by Vivian O'Brien and F. Eugene Logan.
May 64, 148p CM-1045
Contract NOw62 0604c

Unclassified report

Descriptors: (*Flat plate models, Fluid flow), (*Laminar flow, Boundary layer), Viscosity, Oscillation.

An oscillating flat plate apparatus allows study of the periodic laminar flows of viscous fluids induced by the plate motion. The measurements and their comparison with parallel flow theory clearly show the periodic flow is a combination of oscillating flow and pulsating flow. The parameter for similarity predicted from the laminar theory seems justified, but above a critical frequency the flow becomes less regular. This parameter along is not adequate to describe the time-dependent flow. (Author)

AD-607 123 Div. 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB,Ohio.
APPLICATION OF THE NEWTON RESISTANCE LAW TO THE CALCULATION OF AERODYNAMIC COEFFICIENTS OF BODIES OF ROTATION AT GREATER SUPERSONIC VELOCITIES,
by Ya. G. Kovalev. 1 Oct 64, 9p
FTD TT64 561; TT 64 71529

Unclassified report

Unedited rough draft trans. of mono. Voprosy Analiticheskoi i Prikladnoi Mekhaniki (Problems of Analytical and Applied Mechanics) Moscow, 1963, p. 157-160. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Supersonic flow, Rotation), (*Rotation, Aerodynamic characteristics), Velocity, Angle of attack, Numerical analysis, USSR.

AD-607 125 Div. 9, 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
A SOLUTION FOR A BOUNDARY LAYER EQUATION,
by L. G. Petrosyan. 29 Sep 64, 14p
FTD TT64 559; TT 64 71527

Unclassified report

Unedited rough draft trans. of Akademiya Nauk Armyanskoi SSR, Erevan. Izvestiya. Seriya FizikoMatematicheskikh Nauk, 1963, v. 16, no. 5, p. 91-98. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Boundary layer, Equations), (*Differential equations, Numerical analysis), Laminar boundary layer, Flat plate models, Turbulence, Fluid mechanics, Potential theory, Partial differential equations, USSR.

In this report is discussed one solution of differential equations of a boundary layer.

AD-607 145 Div. 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MEASUREMENT OF BASE PRESSURE IN FREE FLIGHT,
by G. I. Mishin. 18 Sep 64, 11p
FTD TT64 373; TT 64 71539

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie 1963, no. 6, p. 116-118.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Base flow, Pressure), Wind tunnel models, Cylindrical bodies, Aerodynamic characteristics, Photographic analysis, USSR.

The dependence of base pressure on the Mach number M on cylindrical bodies having the front section in the shape of a hemisphere in the range of M numbers from 1.32 to 2.91 and on the Reynolds number R sub L (varying proportionally to the velocity) from 0.9 . 1,000,000 to 2.0. 1,000,000 was investigated on a modernized ballistic unit. The experiments were carried out with respect to a method using the deflection of a rubber diaphragm placed in the bottom of the model and sealing off a small cavity filled with air at 1 atm and the temperature of the ambient medium.

AD-607 151 Div. 9, 30
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
AN ELECTROMAGNETIC SHOCK TUBE FOR AERODYNAMIC RESEARCH,
by Richard W. Ziemer. 17 Jun 58, 36p
STL/GM-TR-0127-00419
Contract AF04 647 127
PB 158 138

Unclassified report

Rept. on Boundary Layer Research.

Descriptors: (*Shock tubes, Electromagnetism), Aerodynamic characteristics, Scientific research, Operation, Electric discharges, Magnetic pinch, Magnetohydrodynamics, Performance (Engineering), Design.

An electromagnetically driven shock tube was studied as a possible new tool for aerodynamic research in which velocities of up to 41,000 feet per second are obtainable in air. At these high velocities stagnation temperatures of about 35,000K are produced. The simple construction and operation of the shock tube is described and an evaluation is made of its performance. The potentialities and limitations of the apparatus are discussed with regards to research applications. The results of some magnetoaerodynamic studies are presented to show the usefulness of this type of shock tube. (Author)

A series of investigations were undertaken in a water tunnel to obtain greater insight into the disturbances encountered by aircraft engaged in the process of landing on a carrier. Water tunnel tests were selected because the use of water as the test medium permitted the disturbed flow areas to be identified by the cavitation phenomenon. In addition, these studies were undertaken at Reynolds numbers higher than those normally achieved in wind tunnel investigations. Key conclusions are that dynamic conditions produce flow regimes significantly different from those produced with steady state conditions; that the downstream wake is periodic, with the periodicity having a direct relationship with the pitching and heaving motions of the ship; that the overhang of the deck is the principal cause of the flow disturbances (far outweighing the disturbances caused by the island); and that steady state measurements are of considerable value and do permit some quantitative estimation of the velocity fluctuations occurring in a wake resulting from carrier motions. (Author)

AD-606 918 Div. 9
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
GENERAL CHARACTERISTICS OF BINARY BOUNDARY LAYERS WITH APPLICATIONS TO SUBLIMATION COOLING,
by Joseph F. Gross, David J. Masson, and Carl Gazley, Jr. 8 May 58, rev. 1 Aug 58, 64p P-1371
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Boundary layer, Hypersonic flow), (*Cooling, Heat transfer), Sublimation, Ablation, Transport properties, Friction, Laminar boundary layer, Turbulence, Injection, Impurities, Molecular weight, Mathematical analysis, Re-entry vehicles, Stability.

AD-606 945 Div. 9
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PISTON THEORY APPLIED TO STRONG SHOCKS AND UNSTEADY FLOW,
by J. L. Raymond. 5 Jun 58, 12p P-1395
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Two-dimensional flow, Aerodynamic characteristics), (*Pistons, Theory), Pressure, Airfoils, Equations, Moments, Force (Mechanics).

AD-606 982 Div. 9
OTS Prices: HC $3.00/MF $0.75

Douglas Aircraft Co., Inc., Santa Monica. Calif.
ANALYSIS OF FREE SHEAR LAYER WITH FINITE INITIAL THICKNESS AND ITS APPLICATION TO BASE FLOW,
by K. Toba. 14May 64, 96p SM-45943
Unclassified report

Descriptors: (*Fluid flow, Mathematical analysis), Two-dimensional flow, Boundary layer, Heat transfer, Shear stresses, Surfaces.

A theoretical study is presented which concerns the development of a two-dimensional free shear layer with finite initial thickness. Near the initial point, a nonsimilar solution is found by matching an inner solution for the mixing layer with an outer solution for the shear layer at the edge of the mixing layer. Far from the initial point, an asymptotic similar solution is possible and can be determined uniquely by matching the initial solution with the perturbed asymptotic solution within the common domain of convergence. Application of this study to the base flow is aimed at improving the classical Chapman theory by taking into account the expansion of the separated boundary layer at the base, the mass blowing or suction from the body surface with or without inclusion of the base, and the heat transfer effect. Preliminary numerical results are in general agreement with available experimental data. An extensive program of numerical calculations and an extension of the formulation to cover real gas effects is under way. (Author)

AD-607 023 Div. 9
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A GENERAL THEOREM CONCERNING THE STABILITY OF A PARTICULAR NON-NEWTONIAN FLUID,
by Samuel M. Genensky. 3 Sep 58, rev. 20 May 59, 15p P-1484
Unclassified report

Descriptors: (*Fluid mechanics, Theorems), (*Stability, Laminar flow), Two-dimensional flow, Fluid flow, Incompressible flow, Boundary value problems, Equations, Motion.

It was the intention of the present paper to prove a theorem concerning the stability of a particular non-Newtonian fluid suggested to the author by Professor R. S. Rivlin of Brown University. The method used in proving this theorem is similar to that employed by H. Schlicting in his proof of a similar theorem for an inviscid fluid which was originally established by Lord Rayleigh. The acceleration gradients introduced by the non-Newtonian fluid model into the constitutive equations were found to alter the stability criterion set forth by Rayleigh for an inviscid fluid. (Author)

AD-607 038 Div. 9, 25
OTS Prices: HC $5.00/MF $1.00

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
PRESSURE AND HEAT TRANSFER MEASUREMENTS FOR HYPERSONIC FLOWS OVER EXPANSION CORNERS AND AHEAD OF RAMPS. PART IV: MACH 8 HEAT TRANSFER DATA FOR FLOWS AHEAD OF RAMPS, PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS,
by Louis G. Kaufman, II. Jul 64, 173p
Contract AF33 616 8130, Proj. 8219 Task 821902
ASD TDR63 679 P4
Unclassified report

A portion of the original document contains fine detail which make reading of photocopy difficult.
See also AD-601 805.

Descriptors: (*Hypersonic flow, Heat transfer), (*Heat transfer, Hypersonic flow), Pressure, Flat plate models, Wind tunnels, Aerodynamic heating, Hypersonic characteristics, Aerodynamic control surfaces, Experimental data, Graphics.

A study was made of the hydrodynamics and heat transfer of a two-component stream, 5 to 15% water droplets in air, flowing over a heated, vertical cylinder. In all cases examined, a liquid film formed on the cylinder forward surface; under some conditions water droplets bounced from the surface upon striking it. Hydrodynamic behavior was visually observed and documented by high-speed movies. Heat transfer data were taken at various stations around the cylinder with both simple air flow and the two-component flow. Analysis indicated much greater heat transfer rates with two-component flow and the experimental data bore this out, yielding an intensification in heat transfer coefficient to 2.5 to 9 times. Semiquantitative explanation was afforded by a simple liquid film cooling model, but allowance for evaporative cooling would improve the explanation. When droplets bounced from the surface, intensifications up to 20 times were observed, but this condition was too complex for interpretation within the subject program. (Author)

AD-607 251 Div. 9, 1
OTS Prices: HC $3.00/MF $0.75

Boeing Co., Renton, Wash.
ANALYTICAL DETERMINATION OF THE VELOCITY FIELDS IN THE WAKES OF SPECIFIED AIRCRAFT.
Final rept. phase 2,
by W. J. Bennett. May 64, 78p
Contract FA WA4450, Proj. 101 25R
FAA RD64 55

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Wake, Velocity), (*Aircraft, Aerodynamic characteristics), Air traffic control terminal areas, Air traffic, Aviation safety, Helicopters, Transport planes, Separation, Rotary wings, Determination, Analysis.

The report documents phase II of a two-part study for the prediction of the velocity fields in the wakes of fixed-wing and rotary-wing aircraft. The material presented comprises one part of a larger program directed toward determining safe separation times and distances for aircraft operating in the air terminal traffic pattern. Thirty-three aircraft currently operating within the Air Traffic Control system are analyzed. Numerical data are presented in tabular and curve form for eleven of the aircraft, defining their respective wake velocity fields. A discussion of the assumptions and limitations of the analytical models used is included along with a discussion of possible correlation of the calculated values with test results. (Author)

AD-607 318 Div. 9, 1
OTS Prices: HC $6.00/MF $1.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEWS OF SCHOOLS OF HIGHER EDUCATION. AERONAUTICAL ENGINEERING, 1963, VOL. 6, NO. 1.
21 Aug 64, 214p
FTD MT63 285; TT 64 71569

Unclassified report

Edited machine trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Aviatsionnaya Tekhnika (USSR) 1963, v. 6, no. 1, p. 1-175.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aerodynamic configurations, Scientific research), (*Aeronautics, Scientific research), Design, Fluid flow, Viscosity, Ellipsoids, Cylindrical bodies, Conical bodies, Structural shells, Supersonic diffusers, Temperature, Mixed flow compressors, Buckling (Mechanics), Shear stresses, Thermal stresses, Deformation, Oscillation, Phase studies, Turbojet engines, Turbines, Air craft tires, Laminar flow, Pumps, Downwash, Wings, Loading (Mechanics), Differential equations.

Twenty reports of Soviet scientific research on aerodynamics and aeronautical engineering are presented. The reports represent research on aviation technology which is being conducted in the higher education institutions of the USSR.

AD-607 353 Div. 9
OTS Prices: HC $2.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
THE METHOD OF CHARACTERISTICS FOR THE SUPERSONIC FLOW OF AN IDEAL DISSOCIATING GAS. 1. EQUILIBRIUM FLOW.
Mathematical note,
by F. Edward Ehlers. Jul 64, 49p D1-82-0364, Boeing-Math-355

Unclassified report

Also available from the author.

Descriptors: (*Supersonic flow, Mathematical analysis), (*Programming (Computers), Gas flow), Dissociation, Axially symmetric flow, Two-dimensional flow, Thermodynamics, Equations, Transformations (Mathematics), Shock waves.

The method of characteristics for the supersonic axially symmetric or two-dimensional flow of Lighthill's ideal dissociating gas under thermodynamic equilibrium is formulated, for efficient calculation, by an electronic digital computer. The equations are simplified by the introduction of the streamline slope and the cotangent of the Mach angle as independent variables. Under this transformation, the coefficients in the characteristic differential equations become rational algebraic functions. Procedures for computing the flow conditions at the next downstream interior point and for computing the next downstream point along a solid boundary, along a shock wave, and along the axis are described in detail. A complete program coded in FORTRAN for the IBM 7094 computer is listed and instructions for its use are explained. (Author)

AD-607 382 Div. 9, 30
OTS Prices: HC $1.00/MF $0.50

Training Center for Experimental Aerodynamics, Rhode-Saint-Genese (Belgium).
MODULATION TECHNIQUES FOR MEASUREMENTS IN LOW DENISTY HYPERSONIC WIND TUNNELS,
by J. J. Smolderen. 25 Sep 64, 18p
Grants AF AFOSR64 1875, AF EOAR63 41

Unclassified report

Presented at the Semi-Annual Supersonic Tunnel Association Meeting (22nd) held at the von Karman Institute for Fluid Dynamics, Rhode-Saint-Genese, Belgium, 24-25 Sep 64.

Descriptors: (*Aerodynamic loading, Transducers), (*Transducers, Aerodynamic loading), Hypersonic wind tunnels, Wind tunnel models, Aerodynamic characteristics, Measurement, Instrumentation, Ferroelectric materials, Electronic equipment, Fluid mechanics.

A new technique for the measurement of small forces

AD-607 180 Div. 9, 32
OTS Prices: HC $7.00/MF $1.50

Massachusetts Inst. of Tech., Cambridge.
AN INDEX TO THE TWO-PHASE GAS-LIQUID FLOW LITERATURE, PART II,
by S. William Gouse, Jr. Sep 64, 318p DSR-8734-4
Contract Nonr1841 73

Unclassified report

See also AD-411 512

Descriptors: (*Bibliographies, Fluid flow), (*Fluid flow, Bibliographies), Reviews, Indexes, Fluid mechanics, Gas flow, Liquids.

A total of 1800 separate references on certain types of two-phase gas-liquid flow phenomena have been found, vertified, listed, and indexed by subject and principle author. This literature survey was carried out as one phase of a continuing program to determine the state of the art in two-phase gas-liquid flow phenomena. It is expected that this program will continue with the publication of additional critical reviews and evaluations of various problem areas in two-phase flow as well as with the publication of Par t III of the Index. The problem areas of condensation, cavitation, and atomization have been generally excluded except through error or when references were of such a basic character as to be generally useful. (Author)

AD-607 204 Div. 9
OTS Prices: HC $2.00/MF $0.50

Virginia Univ., Charlottesville.
BACKGROUND AND SAMPLING EFFECTS IN FREE JET STUDIES BY MOLECULAR BEAM MEASUREMENTS, Technical rept.,
by John B. Fenn and James B. Anderson.
Sep 64, 40p PR-108-P
Contract Nonr3623 00, Proj. NR098 038

Unclassified report

Subcontracted to Princeton Univ., N. J. Presented at the International Symposium (4th) on Rarefied Gas Dynamics, Univ. of Toronto, 14-17 Jul 64.

Descriptors: (*Superaerodynamics, Jets), (*Supersonic flow, Pressure), Nozzles, Attenuation, Scattering, Molecular beams.

The effects of finite background pressures on free supersonic jets from sonic nozzles were investigated. It was found that at sufficiently low jet densities, which were characterized in terms of nozzle Knudsen number, axial distance and background pressure level, the background gas freely invades the jet flow field. This invasion results in substantial scattering of the jet molecules with the consequence that molecular beams extracted from such jets suffer a marked attenuation of their intensity. Some possible implications with respect to previously observed species separation are discussed. (Author)

AD-607 215 Div. 9
OTS Prices: HC $3.00/MF $0.75

Aerospace Corp., Los Angeles, Calif.
NONEQUILIBRIUM HYPERSONIC STAGNATION FLOW AT LOW REYNOLDS NUMBERS,
by G. I. Inger. 3 Sep 64, 100p
TDR-269(4230-20)-10
Contract AF04 695 269
SSD TDR64 118

Unclassified report

Descriptors: (*Hypersonic flow, Nonequilibrium flow), (*Stagnation point, Hypersonic flow), Reynolds number, Blunt bodies, Flight, Boundary layer, Vortices, Heat transfer, Diatomic molecules, Gases, Air, Recombination reactions, Reaction kinetics, Dissociation, Continuum mechanics, Numerical analysis.

An analysis of nonequilibrium-dissociated stagnation point flow on highly cooled blunt bodies in a hypersonic stream of air or diatomic gas at low Reynolds numbers is presented. An arbitrary atom recombination rate on the surface is allowed. With the use of a continuum, thin shock layer model, it is shown that for flight speeds on the order of 25,000 ft/sec or less, the problem can be broken down into two regimes, both of which can be treated analytically with good approximation. The first is a generalized nonequilibrium vorticity-interaction flow regime where most of the significant gas phase reaction effects occur, including the transition from recombination rate to dissociation rate-controlled behavior. The closed form solutions given for this regime predict atom concentrations and nonequilibrium heat transfer within 10 percent of exact numerical solutions down to shock layer Reynolds numbers of roughly 100. The second and lower Reynolds number regime embraces fully viscous shock layer flow with appreciable nonadiabatic shock slip effects; here an analytical solution is given by treating the flow as nearly chemically frozen throughout. (Author)

AD-607 234 Div. 9
OTS Prices: HC $2.00/MF $0.50

Virginia Univ., Charlottesville.
DYNAMICS OF MULTI-PHASE FLOW SYSTEMS.
Technical rept.,
by S. L. Soo. Sep 64, 44p ILL-18-P
Contract Nonr3623 00, Proj. NR098 038

Unclassified report

Prepared by Illinois Univ., Urbana.
To be submitted for publication in the I/EC Fundamentals Qtrly.

Descriptors: (*Gas flow, Colloids), (*Aerosols, Fluid dynamic properties), Particle size, Particles, Distribution, Adiabatic gas flow, Laminar boundary layer, Hydrodynamics, Two-dimensional flow, Mathematical analysis, Continuum mechanics, Feasibility studies, Phase studies.

General motion of non-reactive gas-solid systems in potential fields with distribution in size of solid particles was formulated throught the introduction of 'multi-phase' generalization. Cases of adiabatic potential flow, laminar boundary layer motion, and electrohydrodynamic slug flow were illustrated and physical significance of results were discussed. Results demonstrate feasibility of treating such a flow system rigorously. (Author)

AD-607 237 Div. 9, 25
OTS Prices: HC $1.75/MF $0.75

Marquardt Corp., Van Nuys, Calif.
RESEARCH INVESTIGATION OF TWO-COMPONENT HEAT TRANSFER,
by A. Acrivos, J. E. Ahern, and A. R. Nagy, Jr.
Jul 64, 95p
Contract AF33 657 10930, Proj. 7063, Task 7063 01
ARL 64 116

Unclassified report

Descriptors: (*Heat transfer, Two-dimensional flow), (*Hydrodynamics, Heat transfer), Cylindrical bodies, Films, Liquids, Sprays, Drops, Water, Gas flow, Cooling, Injection, Surfaces, Tables, Heat transfer coefficients, Test equipment.

10. Fuels and Combustion

AD-606 890 Div. 10, 4
OTS Prices: HC $2.00/MF $0.50

Virginia Univ., Charlottesville.
THE ROLE OF INERTS IN HYDROCARBON FLAMES.
Technical rept.,
by R. H. Atalla and K. Wohl. Sep 64, 34p DEL-15-P
Contract Nonr3623 00, Proj. NR098 038
Unclassified report

Prepared by Delaware Univ., Newark.
Presented at the Tenth International Symposium on Combustion, Cambridge, England, 17-21 Aug 64.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Hydrocarbons, Flames), (*Flames, Hydrocarbons), (*Butane, Combustion), Oxygen, Additives Nitrogen, Temperature, Heat transfer, Emissivity, Diffusion, Thermochemistry, Reaction kinetics, Spectra (Infrared), Spectra (Visible and ultraviolet).

The role of inerts in hydrocarbon flames close to heat sinks was explored in a spectrophotometric study of low pressure flat butane-oxygen flames to which were added different amounts of nitrogen while as many other variables as possible were held constant. Measurements of flame temperatures led to the discovery that the presence of an inert can bring about reductions in the heat losses to the sink, which can more than compensate for the effect of thermal dilution. Thus, flames containing nitrogen were found to possess higher temperatures than those of the pure fuel oxidant mixture when burned at the same rate. A theoretical analysis leads to conclusions which are in agreement with the experimental results. Variations in the intensity profiles of emitters in the main reaction zone can be interpreted in terms of the increased resistance to diffusion attending nitrogen addition and the higher frequency of termolecular collisions relative to bimolecular collisions. (Author)

AD-606 925 Div. 10, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
BOOK REVIEW; BRUCE NETSCHERT, THE FUTURE SUPPLY OF OIL AND GAS,
by Harold Lubell. 4 Jun 58, 6p P-1382
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Petroleum, United States), Production, Costs, Abundance, Reviews.

One of the important factors affecting the future of the oil producers of the Middle East is the availability of alternative sources of supply elsewhere. Among these, the United States will continue to rank high for a long time to come, as a variety of estimates have shown. Out of the existing welter of estimates, hypotheses, and assumptions about U. S. reserves and production capacity, Bruce Netschert has distilled a consistent set of domestic supply projections as part of an investigation by Resources for the Future of the energy position of the U. S. through 1975.

AD-606 959 Div. 10
OTS Prices: HC $6.00/MF $1.25

Phillips Petroleum Co., Bartlesville, Okla.
THERMAL STABILITY OF HYDROCARBON FUELS.
Rept. for 1 Jun 63-31 May 64,
by Lucien Bagnetto and Harold T. Quigg.
21 Aug 64, 201p
Contract AF33 657 10639, Proj. 3048, Task 304801
APL TDR64 89 P1
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Jet engine fuels, Stability), (*Hydrocarbons, Stability), Pyrolysis, Test methods, Aging (Materials), Fuel additives, Ultraviolet radiation, Fuel tanks, Thermal stresses.

A 5-ml Bomb test method was modified to improve its ability to measure small differences in thermal stability quality of fuels. This test method is based upon the loss in UV light transmittance experienced when a 5-ml sample of the fuel is heated to a given temperature for twenty minutes. A threshold failure temperature for a given fuel is determined by heating the bomb over a range of temperatures to establish the level of heating required to produce an arbitrary loss of 25 units in light transmittance at 350 millimicrons wavelength. A significant relationship was found between threshold failure temperatures determined for eleven non-additive fuels using the 5-ml Bomb test method and the ASTM-CRC Coker, but not for seven additive-containing fuels. A good relationship was found between the 5-ml Bomb and MINEX heat exchanger test rig, using seven fuels, three of which contained additives. Several procedures were evaluated for accelerating the aging of fuels as possible test methods for predicting deterioration in thermal stability during storage. Procedures such as thermal stressing, ultraviolet irradiation, chemical initiation, and iron oxide catalysis, showed accelerated aging effects for a variety of fuels, as measured by deterioration in UV light transmittance. (Author)

AD-607 010 Div. 10, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A REVIEW OF: OEEC, OIL: THE OUTLOOK FOR EUROPE; OEEC, EUROPE'S NEED FOR OIL: IMPLICATIONS AND LESSONS OF THE SUEZ CRISIS,
by Harold Lubell. 15 Aug 58, 6p P-1461
Unclassified report

Review of monos. pub. in Paris, Sep 56 and Jan 58.

Descriptors: (*Petroleum, Western Europe), (*Western Europe, Petroleum), (*Fuels, Western Europe), Economics, Energy, Coal, Gasoline, Storage, Middle East, Reviews.

The last two reports of the OEEC's Oil Committee constitute the best available summary of Western Europe's views on its situation with respect to oil. Straddling the Suez crisis, they provide a good mirror of Europe's growing awareness of the extent of its stake in Middle East oil. 'Oil: The Outlook for Europe' was published after the Egyptian nationalization of the Suez Canal, but before the Anglo-French-Israeli attack on Egypt and the subsequent closing of the Canal. Primarily intended to add the details on petroleum to the broader report on 'Europe's Growing

or other low level effects has been developed at the VKIFD low density wind tunnel. Measurement of forces as low as 10 micrograms appear feasible using ferroelectric transducers in conjuction with a low level tuned amplifier system and synchronous demodulator. This performance is made possible by periodically screening the flow on the model or even chopping the full flow of the wind tunnel by means of a mechanically actuated screen. Such modulation techniques, which result in considerable noise and drift reduction because of the narrow band width of a system using synchronous demodulation are of course widely used for the measurement of low level DC signals as well as detection of weak radiation, molecular beams, biological phenomena, etc. (Author)

AD-607 387 Div. 9, 12
OTS Prices: HC $4.00/MF $0.75

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
PRELIMINARY ANALYSIS OF A HYPERSONIC, SLENDER, POINTED CONES FRONTAL FLOW FIELD, by E. R. Coleman. Jan 62, 112p BSC-29092, FS-62TN-1020

Contract AF04 647 911

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nose cones, Hypersonic characteristics), (*Hypersonic flow, Atmosphere entry), (*Reentry vehicles, Aerodynamic characteristics), Slender bodies, Conical bodies, Boundary layer, Shock waves, Laminar flow, Thermodynamics, Mathematical analysis, Graphics.

Knowledge of the frontal flow field is a necessary prerequisite to an understanding and/or analysis of a bodys reentry characteristics. It is the purpose of the report to provide preliminary estimates of such flow fields for a slender, pointed cone traversing the earth's atmosphere at hypersonic velocities. The analysis is divided into two parts: the inviscid portion of the shock layer and the boundary layer. Estimates are made of the thermo and hydrodynamic characteristics of each throughout the critical phase of reentry. Eleven specific flight conditions are considered corresponding to 25 kilofeet increments between 50 and 300 kilofeet altitudes. The results are presented in both tabular and graphical forms. (Author)

AD-607 178 Div. 10, 12, 27
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ACCUMULATION OF OXYGEN IN FLIGHT.
29 Sep 64, 4p
FTD TT64 578; TT 64 71551

Unclassified report

Unedited rough draft trans. of Kryl'ya Rodiny (USSR) 1963, v. 14, no. 10, p. 38.

Descriptors: (*Rocket igniters, Oxygen), (*Oxygen, Rocket igniters), Nitrogen, Fuel tanks, Hydrogen, Liquefied gases, Rocket propellants, Compressed air, Heat exchangers, USSR.

The accumulating of oxygen necessary for feeding a rocket power plant during flight is described. In power plant installations using oxygen as a fuel component, the accumulation of atmospheric air during flight includes greater possibilities of increasing the range and duration in flight of a hypersonic aircraft.

AD-607 223 Div. 10
OTS Prices: HC $5.00/MF $1.00

Naval Ordnance Lab., White Oak, Md.
SOLID-PROPELLANT ROCKET IGNITION RESEARCH. Final rept.,
by C. F. Sharn, R. L. Beauregard, J. D. Ferguson, E. K. Lawrence, and W. C. Ragsdale. 22 Jul 64, 152p
Task 22064 212 1F009 06 04
NOL TR64 107

Unclassified report

Descriptors: (*Solid rocket propellants, Ignition), (*Rocket igniters, Design), Heat transfer, Electronic equipment, Thermocouples, Performance (Engineering), Tests, Physical properties, Propellant grains, Scientific research, Instrumentation, Temperature, Surface properties, Time.

A theoretical and experimental study was made of solid rocket ignition for the purpose of obtaining igniter design criteria. Heat-transfer, ballistic, and ignition data were obtained by firing a rocket-type igniter, venting non-condensable products at an unsteady rate, into a small rocket. Measurements were made of igniter and rocket pressures, grain surface temperatures, and ignition times. In the tests, the heat fluxes ranged from 19 to 48 cal/sq. cm.-sec and ignition times from .002 to .015 sec. It was found that the ignition test data were in fair agreement to those predicted from the von Elbe ignition theory. An igniter design method, developed from test data and the von Elbe theory, is described. (Author)

AD-607 288 Div. 10, 13, 22
OTS Prices: HC $2.00/MF $0.50

California Forest and Range Experiment Station, Berkeley.
IGNITION OF BLACK ALPHA-CELLULOSE PAPERS BY THERMAL RADIATION, SQUARE WAVE PULSE. Interim technical rept.,
by F. M. Sauer. Sep 56, 34p
AFSWP 869

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Paper, Ignition), (*Nuclear explosion damage, Fires), (*Fires, Ignition), Cellulose, Thickness, Density, Thermal properties, Combustion, Flames, Pyrolysis, Moisture, Thermal radiation.

Available data on critical energies for sustained ignition of black alpha-cellulose paper in the absence of forced convective heat losses are correlated against exposure time on a nondimensional basis. Investigations cover a range of irradiance from 2 to 25 cal/sq cm sec, exposure time from 0.1 to 4 seconds, and paper thickness from 2 to 30 mils. Ignition energies for papers of two nominal densities were determined. Results are presented in terms of an energy modulus and the Fourier modulus for a constant value of E/RT sub o equal to 44. For Fourier moduli less than 0.4, the energy modulus approaches a constant value of approximately 0.11. As the Fourier modulus increases, the energy modulus decreases to a minimum value of 0.068 at a Fourier modulus of 0.8. For Fourier moduli above 0.8, the energy modulus increases with exposure time according to a given equation. Regions of ignition, transiet flaming, destruction (without flame), and nondestruction are illustrated in terms of the above-mentioned dimensionless moduli. (Author)

AD-607 334 Div. 10, 4, 27
OTS Prices: HC $6.00/MF $1.50

Princeton Univ., N. J.
THE GAS PHASE DECOMPOSITION OF HYDRAZINE PROPELLANTS,
by Igor J. Eberstein. 1964, 289p AER-708
Contract AF49 638 1268

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Hydrazine, Decomposition), (*Rocket propellants, Hydrazine), (*Decomposition, Hydrazine), Hydrazine derivatives, Water, Mixtures, Methyl hydrazines, Adiabatic gas flow, Conical nozzles, Chemical reactions, Combustion chambers, Dimethyl hydrazine (1-1), Kinetic theory, Test equipment, Statistical data, Measurement, Gases.

The decomposition of hydrazine, hydrazine-water mixtures, UDMH, and monomethylhydrazine were studied in the Princeton adiabatic flow reactor. The overall reaction order of all three monopropellants was found to be very close to unity. A comparison of the reaction rates showed that, in the temperature regime of this study, UDMH decomposition is fastest, hydrazine decomposition is slowest, and the monomethylhydrazine decomposition rate is intermediate. Reaction mechanisms for the thermal gas phase decomposition of hydrazine, and its methyl derivatives, were postulated and studied numerically. A study of hydrazine-water mixtures showed their rates to be slower than those of the anhydrous material by approximately a factor of 10, and independent of the amount of water added. Slightly wet hydrazine behaved kinetically like the hydrazine-water mixtures.

AD-607 372 Div. 10, 27
OTS Prices: HC $1.00/MF $0.50

Aerospace Technology Div., Library of Congress, Washington, D. C.
SOME PROBLEMS PERTAINING TO LUBRICATION AND FUEL TECHNOLOGY: SUMMARY OF DATA. Rept. no. 35.
23 Oct 64, 6p
ATD U64 111; TT 64 71571

Unclassified report

Needs of Energy' published a few months earlier by the OEEC's Energy Commission, the report of the Oil Committee gives only slight hints of the threat of disruption of the flow of Europe's supplies of oil from the Middle East.

AD-607 013 Div. 10, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A REVIEW OF ENERGY FORECASTS IN WESTERN EUROPE,
by Harold Lubell. 21 Aug 58, 7p P-1466
Unclassified report

Review of monos. 'Europe's Growing Needs of Energy: How can they be met', Paris, Sep 56; 'Etude sur la Structure et les Tendances de l'Economic dans les Pays de la Communaute', Luxembourg, Mar 57; and a 'A Target for Euratom', by Louis Armand and others, May 57.

Descriptors: (*Western Europe, Fuels), (*Fuels, Western Europe), Energy, Economics, Coal, Electric power production, Petroleum, Consumption, Nuclear energy, Reviews.

Europe's growing fuel deficit is largely responsible for the existence of two of the international organizations which have been created in Little Europe in recent years: the European Coal and Steel Community (ECSC) and Euratom. It is also the cause for an increasing amount of concern on the part of Western Europe's elder international agency, the Organization for European Economic Cooperation (OEEC), and the European regional organization of the United Nations, the Economic Commission for Europe (ECE). Of these, the ECSC, Euratom, and the OEEC have published reports on the energy problem of that part of Europe within its own province; the ECE has an energy study for all of Europe in the works. All of them are concerned with projecting energy requirements and regional deficits two decades into the future -- to 1957.

AD-607 062 Div. 10, 16, 17
OTS Prices: HC $5.00/MF $1.00

Melpar, Inc., Falls Church, Va.
MECHANISM OF MICROBIOLOGICAL CONTAMINATION OF JET FUEL AND DEVELOPMENT OF TECHNIQUES FOR DETECTION OF MICROBIOLOGICAL CONTAMINATION. PART I. RELATIONSHIPS BETWEEN ALUMINUM CORROSION, SLUDGE FORMATION, AND MICROBIAL METABOLISM.
Interim summary rept. no. 2, 1 Mar 63-1 Jan 64,
by Gordon C. Blanchard and Charles R. Goucher.
Jan 64, 169p
Contract AF33 657 9186, Proj. 3048, Task 304801
APL TDR64 70 P1
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Jet engine fuels, Contamination), (*Fuel contamination, Microorganisms), Aluminum alloys, Corrosion, Metabolism, Ph, Oxygen, Carbon dioxide, Pseudomonas, Culture media, Toxicity, Ecology, Permeability, Colloids, Inhibition, Hydrocarbons, Infrared spectroscopy, Chromatographic analysis.

Progress was made in determining the relationship between aluminum corrosion, sludge formation, and microbial metabolism. (1) Two assays using tetrazolium reduction were developed for the detection of small numbers of fuel microorganisms. (2) Growth of microorganisms in fuel-water media causes chemical changes in environment which result in a changing microbial flora. During growth in a closed system the pH and oxygen level decrease but the Eh and CO2 levels increase. (3) The conditions for demonstrating microbial corrosion were further defined. The corrosion studies carried out were of value in showing the multiplicity of factors entering into the corrosion process. The studies show that factors such as the composition of the growth medium, the composition, thickness, hardness, and microstructure of the aluminum alloys are of particular importance to the production and character of microbial corrosion. Research on the nutrition of fuel-oxidizing Pseudomonas resulted in the formulation of a fuel-water medium capable of yielding 100 times the growth observed on any medium described in the literature.

AD-607 131 Div. 10, 12, 22
OTS Prices: HC $4.00/MF $1.00

Rocket Propulsion Lab., Air Force Systems Command, Edwards, Calif.
SPACE VEHICLE PROPULSION COMPARTMENT FIRE HAZARD INVESTIGATION, VOLUME 1,
by Paul J. Martinkovic. Jul 64, 126p
Proj. 6753, Task 675303
RPL TDR64 103
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Rocket propellants, Fires), (*Fire safety, Spacecraft), Hazards, Fuels, Oxidizers, Lubricants, Oils, Greases, Hydraulic fluids, Hydrazine, Dimethyl hydrazine (1-1), Combustion.

The report presents the results of the space fire hazard investigation program. The purpose of the program was to determine if a hazardous condition existed under vacuum conditions with regard to leakage of rocket propellants in space vehicle propulsion compartment areas. Tests were conducted under various potentially hazardous conditions at altitudes from 25,000 to 200,000 feet. No attempt was made to define ignition characteristics of the combustible combinations investigated. The test specimens were N2O4, N2H4 and 50% unsymmetrical dimethylhydrazine and 50% hydrazine (0.5 UDMH-0.5 N2H4). Other combustibles i.e., hydraulic fluid, lubricating oil and grease were tested in combinations with a fuel and oxidizer. Non-metallic materials were also tested in combination with the oxidizer and fuels. Analysis of the data revealed that propellant leakage within closed compartment areas can result in fires and explosions. (Author)

AD-607 168 Div. 10, 4
OTS Prices: HC $1.00/MF $0.50

Ethyl Corp., Baton Rouge, La.
RESEARCH ON LIGHT METAL FUELS AND OXIDIZER CHEMISTRY. PART II. OXIDIZER CHEMISTRY.
Quarterly progress rept. no. 4, May-Jul 64,
by W. E. Becker and D. H. Campbell. Jul 64, 9p
EC-670
Contract AF04 611 9376, ARPA Order 24
Unclassified report

See also AD-432 891.

Descriptors: (*Oxidizers, Chemistry), (*Solid rocket oxidizers, Chemistry), (*Nitrogen compounds, Fluorides), Freezing, Molecular weight, Ionization, Sulfuric acid, Reaction kinetics, Heavy water, Hydrochloric acid, Exchange reactions, Chlorides, Electrochemistry, Electrical conductance, Decomposition.

12. Guided Missiles

AD-606 896 Div. 12, 10
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
OPTIMIZATION OF STAGE WEIGHTS FOR LINEAR STRUCTURAL WEIGHT DEPENDENCE ON PROPELLANT WEIGHT,
by J. J. Coleman. 25 Feb 60, 10p
STL/TN-60-0000-09042, SDA-60-4

Unclassified report

Descriptors: (*Staging, Optimization), (*Rocket propellants, Weight), (*Rockets, Staging), Design, Optimization, Structural properties, Equations.

AD-606 898 Div. 12, 2, 15
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
THE RATES OF CHANGE OF SATELLITE ORBITAL ELEMENTS CAUSED BY A PERTURBING FORCE,
by Mildred M. Moe. 22 Oct 59, 18p
STL/TR-59-0000-09893

Unclassified report

Descriptors: (*Calculus of variations, Orbital trajectories), (*Orbital trajectories, Perturbation theory), (*Perturbation theory, Orbital trajectories), (*Satellites (Artificial), Orbital trajectories), Celestial mechanics, Astronautics.

The instantaneous rates of change of satellite orbital elements caused by a perturbing force are derived from astronomical perturbation theory involving tedious mathematical transformations. The purpose of this report is to give a simplified derivation of the same equations by using only elementary principles of mechanics. It is hoped that this approach will make the meaning of the equations more accessible. (Author)

AD-606 943 Div. 12, 19
OTS Prices: None/MF $0.50

RAND Corp., Santa Monica, Calif.
TYPES OF SPACE FLIGHTS,
by R. W. Buchheim. 24 Feb 58, 40p P-1428

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. Document is available in microfiche only.

Descriptors: (*Space flight, Trajectories), (*Orbital trajectories, Reviews), (*Lunar trajectories, Reviews), (*Interplanetary trajectories, Reviews), Satellites (Artificial), Spacecraft, Landing impact, Launching, Space buoys.

Trajectory characteristics of three general categories of space flight are discussed: earth satellite missions, lunar missions, and interplanetary missions. (Author)

AD-607 012 Div. 12, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN APPLICATION OF DYNAMIC PROGRAMMING TO THE DETERMINATION OF OPTIMAL SATELLITE TRAJECTORIES,
by Richard Bellman and Stuart Dreyfus.
19 Aug 58, rev. 20 Jan 59, 19p P-1463

Unclassified report

Descriptors: (*Orbital trajectories, Optimization), (*Satellites (Artificial), Orbital trajectories), (*Dynamic programming, Orbital trajectories), Thrust, Functions, Equations, Numerical analysis, Analytical geometry, Calculus of variations, Transformations (Mathematics), Iterative methods.

Consideration is given to a simplified satellite trajectory problem, corresponding to a flat earth assumption, first treated by Okhotsimskii and Eneev. A numerical solution is presented based upon the functional equation technique of dynamic programming. A proof of the fundamental result in the analytic solution is given. The same computational approach can be applied to more realistic trajectory problems. (Author)

AD-607 041 Div. 12, 15
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
DETERMINATION OF ORBITS USING OPTICAL MEANS. Master's thesis,
by John Ciplickas. Aug 64, 93p
AFIT GA/EE/64-2

Unclassified report

Descriptors: (*Orbital trajectories, Determination), (*Optical instruments, Space navigation), (*Satellites (Artificial), Orbital trajectories), Equations, Programming (Computers), Errors, Analysis.

The object of this thesis was to develop a method of determining the orbit of an uncooperative satellite from an observer satellite of known orbit using optical means. Using the method of Gauss, a set of equations was developed for satellites around the earth. The optical instrument is a simple telescope, mounted on an inertial platform, which reads the right ascension and declination angles. An error analysis was performed on these equations, and a computer program set up. The input data used produced unsatisfactory results, which were attributed to program error. (Author)

AD-607 066 Div. 12, 2, 9
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ATMOSPHERIC PERTURBATIONS OF ARTIFICIAL SATELLITES,
by Edward Leeper. 24 Sep 58, 10p P-1496

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Perturbation theory, Drag), (*Drag, Satellites (Artificial)), (*Satellites (Artificial), Drag), Atmosphere, Orbital trajectories, Circular orbit trajectories, Electron density, Functions, Celestial mechanics, Bessel functions.

A study of the perturbation of artificial satellite orbits by atmospheric drag forces is important in predicting satellite orbits and lifetimes, and can provide a means of obtaining atmospheric data from satellite observations. The purpose of this paper is to present straightforward and accurate methods of computing drag perturbations, with corrections for influencing factors such as the rotation of the earth. (Author)

Surveys of Soviet-Bloc Scientific and Technical Literature, review of mono. Topliva dlya Reaktivnykh Dvigatelei (Fuels for Jet Engines) Leningrad, 1964, 226p by Ya. B. Chertkov and others.

Descriptors: (*Jet engine fuels, Reviews), Textbooks, Specifications, Physical properties, Chemical analysis, Storage, Fluid flow, Lubrication, Combustion, USSR.

The book is a review of the state-of-the art in jet-fuel technology. The purpose is to acquaint the reader with the chemical composition and properties of jet fuels, and to provide information on problems which arise as a result of the current increase in output and consumption and the greater demands made upon the quality of jet fuels. The book generalizes data on the composition and properties of the fuels and on changes occurring during prolonged storage, transportation, and use in aircraft. Accumulated experience on the improvement of performance characteristics by means of additives is reviewed.

AD-607 384 Div. 10
OTS Prices: HC $1.00/MF $0.50

Lockheed Propulsion Co., Redlands, Calif.
THERMAL GRAIN STRUCTURAL ANALYSIS.
Program progress rept. no. 7, 1-30 Jun 62, 30 Jun 62, 16p LPC-578-P-7
Contract AF04 611 8013

Unclassified report

Descriptors: (*Rocket propellant grains, Thermal stresses), Solid rocket propellants, Thermal properties, Aging (Materials), Moisture, Absorption, Failure (Mechanics), Model tests, Stresses, Mathematical analysis, Strain (Mechanics), Rocket motors (Solid propellant), Temperature, Cooling, Bonding.

In tests on the 6 3/4 inch diameter solid cylinder grain model, good agreement between the oretical and observed thermal fields was obtained. Following removal from thermal equilibrium at 75F to a 10F environment, it was observed that the heat front penetration speed agreed within 2 percent of the predicted value and that the 90 percent equilibrium time for the center of the cylinder was obtained within 5 percent of the predicted time. The temperature distributions per se deviated by a maximum of up to 20 percent from the predicted, as anticipated, because of the slight deviation from ideal step thermal changes experienced at the beginning of the test.

11. Ground Transportation Equipment

AD-607 219 Div. 11, 18
OTS Prices: HC $5.00/MF $1.00

Army Tank-Automotive Center, Warren, Mich.
COOLING AND PERFORMANCE CHARACTERISTICS OF THE XM-571 ARTICULATED, UTILITY CARRIER.
Rept. for 5 Apr-13 Jul 63,
by Arthur L. Jaeger, Jr. 31 Aug 64, 160p
Projs. 54703011, 5510 12 289A
ATAC 8248

Unclassified report

Descriptors: (*Tracked vehicles, Performance (Engineering)), (*Army equipment, Tracked vehicles), (*Cooling, Tracked vehicles), Dynamometers, Engines and motors, Temperature, Velocity, Power, Failure (Mechanics), Failure (Mechanics), Transmission gears, Test equipment, Torque, Fuel consumption, Instrumentation.

The performance and cooling characteristics of the XM-571 vehicle were determined and evaluated. The engine was set up in a dynamometer cell and high ambient performance and cooling tests were conducted at full throttle. The engine was then installed in the vehicle and the vehicle was set up in a dynamometer cell. High ambient performance and cooling tests were conducted at full throttle with a 3-5 mph headwind with solar intensity radiation. Maximum observed engine horsepower was 77 at 3800 rpm. Maximum observed sprocket horsepower varied from 64 to 69 at 3800 rpm engine speed, depending on the transmission gear range. Optimum sprocket fuel consumption was 0.63 pound per horsepower hour. The vehicle at full throttle cooled at 115 F ambient with Code F-84 auxiliary cooling fan installed, the transfer case oil level one pint low, and the engine cooling air exhaust dampers secured open. Maximum engine sump oil and spark plug temperatures were 229F and 394F. Maximum transmission and transfer case oil temperatures were 265F and 270F. (Author)

AD-607 345 Div. 11, 9
OTS Prices: HC $5.00/MF $1.00

Hawker Siddeley Canada, Ltd., Toronto.
GEMINI 1-TON, AMPHIBIOUS, OFF-HIGHWAY, AIR-TRANSPORTABLE VEHICLE: CONCEPT EVALUATION PROGRAM.
Final rept.
Jul 64, 166p
Contract DA44 177AMC21T, Task 1D021701A04813
TRECOM TR64 34

Unclassified report

Prepared for Canadian Commericial Corp.
Legibility of this document is in part unsatisfactory.
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Descriptors: (*Amphibious vehicles, Ground effect), (*Ground effect, Amphibious vehicles), Environmental tests, Test vehicles, Swamps, Terrain, Maneuverability, Air transportation, Vehicle wheels, Trafficability, Performance (Engineering), Design, Vehicle chassis components, Ducts, Lift, Flotation.

This report presents the results of testing a full-scale, mock-up chassis representative of a 1-ton, amphibious, off-highway, air-transportable vehicle which utilizes air cushion principles to permit mobility in low-bearing terrain otherwise impassible by a wheeled vehicle. As the main objective of the program was to demonstrate mobility in low bearing terrain, the test vehicle was purely a wheeled platform lacking steering and other essential features of the final version. The test platform was subjected to tests in prepared clay beds of low cone index and also in F1 type muskeg impassable to normal wheeled vehicles. In addition, tests were made on a level hard surface to measure air cushion lift as a function of height. The clay and muskeg testing demonstrated that air cushion assistance can make mobility possible under conditions which would immobilize conventional wheeled vehicles. Also given are the results of the muskeg testing conducted by the Organic and Associated Terrain Research Unit of McMaster University of Hamilton, Ontario. The hard surface tests gave results which indicated reasonably good agreement with accepted air cushion theory. (Author)

in this report. Quantities of interest are wake velocity decay, electron density distribution, wake growth, and transition distance. (Author)

AD-607 202 Div. 12, 30
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
ANALYSIS OF OPERATIONAL READINESS OF MISSILE WEAPON SYSTEMS,
by Jack Coleman and Jack Abrams. 3 Dec 60, 16p
STL/TM-60-0000-19113

Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Checkout procedures), (*Operations research, Weapon systems), Guided missiles, Malfunctions, Probability, Mathematical models, Ordnance.

The objective of this analysis is to evaluate the 'SM-68 Periodic Checkout Frequency Study'. In order to properly appraise the study, it was found necessary to independently develop a mathematical model representing the operational readiness of a ballistic missile system from which the relevant probabilities were determined.

AD-607 207 Div. 12,
OTS Prices: HC $4.00/MF $1.00

General Electric Co., Utica, N.Y.
RELIABILITY VERIFICATION PROGRAM FOR MOD III B AIRBORNE GUIDANCE SUBSYSTEM.
Final rept. 1 Sep 64, 146p
Contract AF04 645 12

Unclassified report

Prepared for General Electric Co. Defense Systems Department, Syracuse, N.Y.

Descriptors: (*Guidance, Guided missiles(Surface-to-surface)), (*Guided missile components, Reliability (Electronics), (*Reliability (Electronics), Guided missile components), Electronic equipment, Flight testing, Simulation, Airborne, Environ mental test, Temperature, Vibration, Electrical equipment, Klystrons, Beacons, Diodes, Thyratrons, Electron tubes, Capacitors, Magnetron, Maintenance, Electro magnetic pulses, Transformers.

This reliability verification test program was designed and performed to achieve three goals. (1) Estimate the reliability of the Mod III B equipment (2) Derive information from which this reliability could be further improved (3) Provide a feasibility study of this method of reliability measurement. Six systems were tested under carefully controlled laboratory conditions to simulate exposure to a typical pattern of pre-flight experience. Having thus been 'conditioned' to typical pre-flight status, each system was then subjected to repeated cycles of the simulated conditions of countdown and flight until failure occurred. The report details the test procedures and presents the significant failure and operating time data accumulated. Data is evaluated in terms of both the statistical model and equipment performance. Failure analysis and corrective follow-up are discussed. The reliability estimate obtained from this program exceeds specified requirements and shows excellent correlation with field experience. (Author)

AD-607 210 Div. 12
OTS Prices: HC $2.00/MF $0.50

Dodco, Inc., Blawenburg, N. J.

SUMMARY OF REQUIREMENTS FOR AIR DATA SENSORS ON LIFTING RE-ENTRY AND GLIDE RETURN SYSTEMS.
Summary rept.
by Daniel O. Dommasch. Aug 64, 35p
Contract AF33 615 1410, Proj. 8222, Task 822207
FDL TDR64 73

Unclassified report

Descriptors: (*Reentry vehicles, Atmosphere entry), (*Atmosphere entry, Control systems), (*Guidance, Reentry vehicles), Weapon systems, Manned spacecraft, Boost-glide vehicles, Atmosphere, Data, Military requirements, Density, Pressure, Angle of attack, Sideslip, Glide-path systems, Aerodynamic characteristics, Instrumentation.

A summary of the requirements for use of air data for re-entry and glide return weapon systems is presented. The systems functions of control, display, prediction, protection, guidance and back up are dealt with and the nature of several proposed re-entry systems examined. An analysis is made of obtainable accuracy in the prediction of aerodynamic and air data parameters pertinent to re-entry systems. Results of numerical multi-degree of freedom simulations of an arbitrary re-entry vehicle and the now defunct X-20A weapons system are provided to establish the effects of parameter variations on re-entry paths. Feasibility of a non-gyro, nonstructural mode coupling, three axis air data based re-entry control system is established within the restriction that proper air data sensors are available. It is concluded that re-entry and glide return systems, other than unmanned or purely experimental equipment, require a basic minimum amount of air data for reliable mission performance. This minimum amount of data consists of air density, total pressure, angle of attack and angle of sideslip. (Author)

AD-607 216 Div. 12, 15
OTS Prices: HC $3.00/MF $0.75

Aerospace Corp., Los Angeles, Calif.
GENERAL EQUATIONS OF MOTION FOR A GRAVITATIONALLY ORIENTED MULTIPLE-PART SATELLITE,
by V. Chobotov. 21 Sep 64, 57p
TDR-269(4540-70)-8
Contract AF04 695 269
SSD TDR64 163

Unclassified report

Descriptors: (*Motion, Satellites (Artificial), (*Satellites (Artificial), Stabilization), Differential equations, Euler's angles, Rotation, Center of mass, Torque, Aerodynamic configurations, Magnetic fields, Damping, Computers, Simulation, Transformations (Mathematics), Stabilization systems.

The general equations of motion for a multiple-part satellite are presented. These equations are then specialized for a two-body satellite that has energy dissipation, which is subject to gravitational, and other, forces. By use of Euler angles and Euler parameters for various coordinate transformations, the scalar forms of the equations are derived: Methods for possible solution of the equations are discussed. (Author)

AD-607 235 Div. 12, 25
OTS Prices: HC $3.00/MF $0.75

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
APPLICATIONS OF ULTRASONICS TO ABLATION STUDIES.
Technical memo.,

AD-607 068 Div. 12, 2
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SPACE ENVIRONMENT,
by S. H. Dole. 15 Sep 58, 21p P-1499
Unclassified report

Text of talk before a meeting of the Long Range Logistics Discussion Group, Maxwell AFB, Montgomery, Ala, 23-26 Sep 58.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Astronautics, Space flight), (*Space environmental conditions, Space flight), Celestial mechanics, Meteors, Interplanetary trajectories, Solar systems, Orbital trajectories, Perturbation theory, Radiation effects, Solar radiation, Cosmic rays.

A brief review is presented of the major aspects of the space environment, including celestial mechanics, meteoritic particles, and radiation problems.

AD-607 118 Div. 12, 19
OTS Prices: HC $5.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A PRELIMINARY INVESTIGATION OF THE USE OF INERTIAL GUIDANCE FOR CO-PLANAR ORBITAL RENDEZVOUS.
Master's thesis,
by Donald B. Darby. Aug 64, 168p
AFIT GA/EE/64 3
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Inertial guidance, Rendezvous trajectories), (*Rendezvous trajectories, Inertial guidance), Orbital trajectories, Transfer trajectories, Spacecraft, Astronautics, Simulators, Digital computers, Programming (Computers).

This thesis is a preliminary investigation of the use of inertial guidance to control the transfer orbit injection phase of an orbital rendezvous. The guidance system to be investigated is discussed along with the rendezvous situation. Assumptions are made to narrow the problem to a rendezvous between elliptical co-planar orbits about a spherical body, with the vehicle being transferred reacting as a point mass. The theory of the guidance equations is given and the method used to solve them is explained fully. An analysis of the functions of the guidance system is made in order to write a digital computer program which will simulate the system. The resulting program simulates the operation of the guidance system and the flight of the space vehicle during both the guidance phase and the coasting phase. It accounts for the fact that due to guidance system and initial condition errors the motion of the vehicle is not exactly as the guidance system computes it to be. With the program three representative cases of rendezvous are investigated. The first case is a rendezvous between widely separated circular orbits; the second is a rendezvous between non-aligned highly eccentric orbits; and the last case is a very realistic rendezvous between slightly eccentric non-aligned low Earth orbits. (Author)

AD-607 129 Div. 12, 5
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
FIRST SPACE FLIGHT AND RADIO ELECTRONICS,
by V. I. Siforov. 21 Sep 64, 9p
FTD TT64 409; TT 64 71525
Unclassified report

Unedited rough draft trans. of Vestnik Svyazi (USSR) 1961, v. 21, no. 7(256) p. 5-6.

Descriptors: (*Space flight, Space communication systems), (*Space communication systems, Space flight), Radio communication systems, Radio transmission, Radio equipment, Space probes, Manned spacecraft, Electronics, USSR.

A brief review of the importance and development of radio electronics applied to the field of space exploration and flight is presented.

AD-607 152 Div. 12, 19
OTS Prices: HC $5.00/MF $1.00

Space Technology Labs., Inc., Los Angeles, Calif.
PERFORMANCE EVALUATION OF THE MIG GYRO FOR BALLISTIC MISSILE APPLICATIONS,
by R. B. Clark and B. H. Evans. 20 Jul 60, 158p
STL/TN-60-0000-09112
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Gyro stabilizers, Guided missiles (Surface-to-Surface)), (*Guided missiles (Surface-to-Surface), Gyro stabilizers), Gyroscopes, Inertial guidance, Performance (Engineering), Test methods, Standardization, Experimental data, Graphics.

This report describes a series of tests performed on two Minneapolis-Honeywell miniature integrating (MIG) gyros. Performance of gyros during the tests is given in detail, and the philosophy, procedures, and merits of each type of test are discussed. The test program had two objectives: to evaluate the gyros themselves, and to study and compare the various types of tests used in the program. Both of the tested gyros performed within the manufacturer's specifications during the entire program, with the exception of a mass shift occurring in one gyro as a result of excessive vibration applied during a test. Results of different tests of the same gyro characteristics correlated, in most cases, within the expected consistency of gyro performance, indicating satisfactory reliability of the test procedures and equipment. (Author)

AD-607 166 Div. 12, 9
OTS Prices: HC $3.00/MF $0.75

Brown Engineering Co., Inc., Huntsville, Ala.
A SURVEY OF HYPERVELOCITY RANGE DATA ON WAKES,
Technical note,
by Soon H. Leong. Jul 64, 68p BrownEng-R-107
Contract DA01 021AMC85Z
Unclassified report

Descriptors: (*Wake, Hypervelocity projectiles), (*Hypervelocity projectiles, Wake), Atmosphere entry, Schlieren photography, High-speed photography, Photographic techniques, Spark shadowgraph photography, Velocity, Doppler radar, Electron density, Gas ionization, Geometric forms, Super aerodynamics, Ranges (Establishments), Experimental data, Hypersonic flow, Measurement.

A compilation of wake data obtained from hypervelocity-range experiments by various investigators is presented

Edited machine trans. of mono. Samonavedenie Raket, Moscow, 1963, 90p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Homing devices, Rockets), (*Rockets, Homing devices), (*Guided missiles, Homing devices), Guidance, Heat homing, Light homing, Radar homing, Ballistics, Ordance, USSR.

Contents:
General principles of the homing guidance system
Classification of systems of control
Principle of operation of homing guidance systems
The target as a source of command signals of homing guidance systems
An active, semiactive and passive homing guidance system
Methods of guidance
Method of direct guidance
Method of guidance by pursuit path
Method of guidance with constant angle of lead
Method of guidance with consecutive (continuous) lead
Homing guidance systems
Active radar homing guidance system
Semiactive radar homing guidance system
Passive infrared homing guidance system
Optical homing guidance system
Acoustic homing guidance systems
Homing guidance system of antimissile missiles
Literature

AD-607 319 Div. 12
OTS Prices: HC $8.10/MF $2.25

System Development Corp., Santa Monica, Calif.
ORBITAL ANALYST HANDBOOK.
Technical memo.
4 May 64, 510p TM-LX-123/000/00
Contract AF19 628 1648, Proj. 496L
ESD TDR64 439
Unclassified report

Descriptors: (*Astronautics, Handbooks), (*Orbital trajectories, Numerical methods and procedures), (*Numerical methods and procedures, Astronautics), Space flight, Launching, Separation, Spacecraft debris, Position finding, Life expectancy, Programming (Computers), Standardization.

This handbook has been prepared to provide personnel assigned to the Orbital Analyst position in SPACETRACK with detailed procedures and standardized methods for accomplishing their assigned tasks in satellite processing. These tasks are: Domestic launch, foreign launch, debris separation, proximity determination, element maintenance, and decay prediction. Each task represents a major orbital problem. A check list for each problem is provided. The required steps leading to the solution of the problem are identified. Analyst procedures are described and cross-referenced to pertinent tasks. Computer programs which support the orbital analyst are organized by functional area and detailed with respect to their use, input options and formats, and output format. Other system programs not of primary interest to the analyst are identified and briefly discussed. Standard system card formats, the system tape requirements, and the operating modes are described in detail. Aids, charts, graphs, and other material which assist in job performance are to be found in the appendix. (Author)

AD-607 343 Div. 12
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
REACTION WHEEL ATTITUDE CONTROL SYSTEM,
by H. Patapoff. 18 Dec 58, 7p STL-GM-42.6-393
Unclassified report

Descriptors: (*Attitude control systems, Operation), (*Spacecraft, Attitude control systems), Satellites (Artificial), Control systems, Torque, Jets, Gases.

The disturbance torques acting upon a satellite or space vehicle are extremely small. In the absence of aerodynamic effects, these torques are on the order of 10 to the minus 4th power lb-ft or less. Therefore, only minute control torques are required to counteract any disturbance which might exist. Torques of this magnitude can be developed by a small a-c or d-c motor connected to a small flywheel. The flywheel is then accelerated according to the torque demands of the control system. Due to the fact that the motor has a maximum speed, for some missions the inertial wheel alone is insufficient for attitude control for any significant period of time. Some means of intermittently slowing down the inertial wheel is therefore necessary. This can be accomplished through the use of gas jets mounted on the vehicle. The purpose of the report is to present a brief description and simplified analysis of a single axis attitude control system using an inertial wheel. A three-axes control system including inter-axis coupling is currently under investigation. (Author)

AD-607 364 Div. 12, 26
OTS Prices: HC $1.00/MF $0.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
ESTIMATION OF PERCENT DEFECTIVE BY VARIABLES SAMPLING,
by H. N. Hadley. 14 Mar 57, 20p RAD-TN-2-57-3
Contract AF04 645 30
Unclassified report

Descriptors: (*Guided missile components, Quality control), (*Quality control, Guided missile components), Nose cones, Ordnance, Statistical analysis, Sampling.

This report described an operating procedure for a variables single sampling plan for destructive testing which will be used when appropriate to decide the acceptability of equipment delivered for installation on the nose cone.

AD-607 366 Div. 12
OTS Prices: HC $1.00/MF $0.50

Space Technology Lab., Inc., (Los Angeles, Calif.)
OPTIMUM INTERPLANETARY ROCKET FLIGHTS,
by Lincoln Turner. 28 Sep 59, 24p
STL/TR-59-0000-00833
Unclassified report

Descriptors: (*Interplanetary trajectories, Optimization), (*Space flight, Optimization), Orbital trajectories, Mars, Ion engines, Vector analysis, Matrix algebra, Iterative methods.

Consideration is given to the problem of optimizing the flight of a vehicle sent from a circular orbit around Earth to a circular orbit around Mars. The vehicle is assumed to be powered by an ion engine. Since the thrust of the vehicle would be very small during the middle portion of the flight, an attempt is made to determine whether or not the same trajectory could be accomplished by turning off the motors during that portion.

by L. C. Lynnworth. 27 Oct 61, 59p RAD-TM-61-37
Contract AF04 694 36, Proj. WS133A
Unclassified report

Descriptors: (*Ablation, Measurement), (*Ultrasonic radiation, Ablation), (*Test methods, Ablation), Reentry vehicles, Non-destructive testing, Heat shields, Thickness, Surface properties, Rupture, Thermodynamics.

Ultrasonic measurement of ablation rate during re-entry is possible, with accuracies dependent on the material and trajectory. Studies of the variables that tend to frustrate ultrasonic ablation-rate measurements reveal certain aspects of the ablation mechanism that may remain undetected, if not for their influence on ultrasonic response. Ultrasonic observations permit one to draw conclusions concerning char depth, and departures from steady-state ablation. Investigation of properties on which the ablation mechanism depends often overlooks the need for proper identification of test specimens, including identification of defects. Ultrasonic evaluation of test specimens is non-destructive, and therefore economically alleviates this problem. (Author)

AD-607 265 Div. 12, 21, 27
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
A STUDY OF ELECTRICAL PROPULSION IN THE SPACE PROGRAM,
by Benjamin Pinkel and Donald L. Trapp. Sep 64, 59p
P-2881-1
Unclassified report

Descriptors: (*Electric propulsion, Space flight), (*Space propulsion, Electric propulsion), Spacecraft, Manned spacecraft, Lunar craft, Logistics, Space probes, Mars, Payload, Weight, Performance (Engineering), Costs, Reliability, Rankine cycle, Nuclear propulsion.

Electrical propulsion systems in space flight is compared with other systems, particularly for the parameters of specific mass and operational endurance. Reliability, developmental time, and costs of elective propulsion is discussed.

AD-607 273 Div. 12, 26
OTS Prices: HC $4.00/MF $1.00

Goodyear Aerospace Corp., Akron, Ohio.
STUDY, FABRICATION, AND TESTING OF PASSIVE SATELLITE MODELS, GRID-SPHERE TYPE.
Rept. for May 63-May 64,
Aug 64, 144p GER-11568
Contract AF33 657 11537, Proj. 4335, Task 433505
SEG TDR64 52
Unclassified report

Descriptors: (*Communication satellites (Passive), Design), Electromagnetic wave reflections, Scattering, Models (Simulations), Propagation, Radar echo areas, Mathematical analysis, Bessel functions, Admittance, Construction, Tests, Geometric forms, Dielectric films, Electrical impedance.

Enhanced backscattering of a wire-grid sphere over that of an equivalent metal sphere in passive communication satellites was discovered in 1960. The purpose of this report is to investigate theoretically and empirically grid spheres, and, if possible, to develop a design formula, and construct an inflatable model for future feasibility tests. The approximate vector potential solution for thin dielectric shells modified for a complex dielectric constant served as theoretical approach. The empirical investigation covered impedance measurements of flat grid panels, and backscattering tests of a 20 inch and an inflatable 14 ft. grid-sphere. The tests confirmed enhanced reflectivity, but did not fully agree with the theory.

AD-607 292 Div. 12, 17
OTS Prices: HC $5.00/MF $1.00

Rocketdyne, Canoga Park, Calif.
FEASIBILITY INVESTIGATION OF A MOVING BELT RADIATOR.
Quarterly progress rept. for 10 Jun-9 Sep 64.
Oct 64, 191p Rocketdyne-R-5670-2
Contract AF33 615 1576
Unclassified report

It appears that some pages were left blank intentionally.

Descriptors: (*Feasibility studies, Radiators), (*Radiators, Spaceborne), Optimization, Heat exchangers, Heat transfer, Thermal conductivity, Antifriction bearings, High temperature research, Vacuum, Model tests, Molybdenum, Stainless steel, Tantalum, Tests.

This report covers the second quarter of a continued research program on the feasibility of a novel concept for the rejection of waste heat in space, the moving belt radiator. Chief concerns of the program are materials compatibility, thermal conductance, and antifriction bearing operation, all at high temperatures in a hard vacuum. During this report period, the materials compatibility and heat transfer investigations continued in the reciprocating-contact testers, the instrumentation and mechanical features of the small-scale model were checked out and improved, analytical optimization studies of the belt radiator were continued, and detail design of the new bearing test rig and selection of retainer materials, lubricants, etc., were completed and manufacture of parts initiated. (Author)

AD-607 299 Div. 12, 19, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTRONIC PILOTS,
by A. A. Dorodnitsyn. 23 Sep 64, 9p
FTD TT64 689; TT 64 71553
Unclassified report

Unedited rough draft trans. of Komsomol'skaya Pravda (USSR) 1964, no. 87(11939) 12 Apr, p. 4.

Descriptors: (*Spacecraft, Automatic pilots), (*Automatic pilots, Space flight), Space navigation, Automatic navigators, Navigation computers, Cybernetics, Control systems, USSR.

Popularized speculations on the use of computers and advanced cybernetics devices for the guidance of spacecraft and other space applications.

AD-607 316 Div. 12
OTS Prices: HC $4.00/MF $0.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
HOMING GUIDANCE OF ROCKETS,
by V. I. Kurkotkin and V. L. Sterligov.
25 Sep 64, 102p
FTD MT64 198; TT 64 71570
Unclassified report

13. Installations and Construction

AD-606 926 Div. 13, 18, 22
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif:
A VUNERABILITY MODEL FOR WEAPON SITES WITH INTERDEPENDENT ELEMENTS,
by Sidney I. Firstman. 27 May 58, rev. 18 Mar 60, 26p P-1384

Unclassified report

Presented at the meeting of the Western Section of Operations Research Society of America, Palo Alto, California, 29 Aug 58.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Weapon systems, Vulnerability), (*Site selection, Weapon systems), (*Military engineering, Site selection), Military facilities, Survival, Probability, Warfare, Mathematical models, Graphics.

This paper describes a simple 'counting' model, employing overlays and probability-grids, which aids in the determination of the trade-off, measured in survival probability, between site dispersal and hardening for a weapon complex composed of several interdependent elements, separated by distances of less than two lethal radii. The survival-probability expressions are obtained through the use of Markov chains. An example of vulnerability estimation by the use of the model is included. (Author)

AD-606 948 Div. 13
OTS Prices: HC $5.00/MF $1.00

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
STABILITY OF CRATER SLOPES.
Final rept.,
by W. E. Strohm, J. S. Ferguson, Jr., and E. L. Krinitzsky. Mar 64, 180p PNE-234F

Unclassified report

Report on Project Sedan.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Soil mechanics, Cratering), (*Cratering, Nuclear explosions), (*Nuclear industrial applications, Civil engineering), (*Engineering geology, Cratering), Underground explosions, Explosion effects, Test facilities, Deserts, Nevada.

Preshot and postshot field investigations of the Sedan crater were made to obtain information on the change in engineering properties of the subsurface soil adjacent to the crater, and to determine the engineering properties of the important physiographic features of the crater such as ejecta and fallback materials. Field investigations included geological studies of the area, undisturbed and general sample borings, and geophysical logs. Subsurface soils consisted of desert alluvium, a relatively dense mixture of silt, sand, and gravel. The behavior, including both immediate and long-term stability, of the slopes forming the Sedan crater is a function of the particular character of the subsurface soils and environmental factors in the area. Consequently, the results obtained at Sedan may not be applicable to other areas.

AD-606 985 Div. 13, 2, 30
OTS Prices: HC $5.00/MF $1.25

IIT Research Inst., Chicago, Ill.
STRAIN VARIATION IN A TRIAXIAL SOIL TEST.
Final rept. for May-Dec 63,
by W. B. Truesdale. Sep 64, 195p IITRI-M6047
Contract AF29 601 6004, Proj. 1080, Task 108008
AFWL TDR64 47

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Soil mechanics, Test methods), (*Engineering geology, Soil mechanics), Soils, Strain (Mechanics), Deformation, Measurement, Strain gages, Experimental data, Graphics.

An experimental program was carried out to evaluate the strain behavior of a soil sample being tested in a triaxial apparatus. The patterns of deformation were obtained at specific locations within the specimen by embedded strain gage measurements. The investigation was made in both noncohesive and cohesive soil types, and included study of the influence of confining pressure, size of specimen, rate of loading, and presence of the gage on the uniformity of deformation. It was determined that the specimen strain behavior is quite different between noncohesive and cohesive soil samples, and that significant nonuniformity of deformation takes place even at small strains, well in advance of failure. (Author)

AD-607 088 Div. 13
OTS Prices: HC $5.00/MF $1.00

Martin Marietta Corp., Orlando, Fla.
THERMAL RESPONSE IN SANDWICH PANELS.
Final rept. for Dec 63-Jul 64,
by P. J. Kendall. Oct 64, 192p OR-6037
Contract AF33 657 8649, Proj. 1467, Task 146702
FDL TDR64 135

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Sandwich construction, Heat transfer), (*Honeycomb cores, Heat transfer), (*Heat transfer, Mathematical models), Thermal radiation, Partial differential equations, Digital computers, Programming (Computers).

An analytical model is presented for predicting thermal response in honeycomb sandwich panels. The model considers a variety of configurations involving single or stacked panels. Consideration is given to all three modes of heat transfer and to temperature dependent thermophysical properties of the materials of fabrication. The heat balance equations are of the finite difference form and employ the forward difference technique for solution. A stability criterion is presented for the heat balance equations. The entire system of equations is programmed for solution on the IBM 7094 digital computer. Validity of a portion of the analytical model is established by comparing predicted results to existing experimental data for single honeycomb panels. (Author)

AD-607 147 Div. 13, 25
OTS Price: HC $4.00/MF $1.00

Forest Products Lab., Madison, Wis.

AD-607 368 Div. 12
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
STATISTICS OF SATELLITES THAT ARE LAUNCHED AT REGULAR INTERVALS AND HAVE AN EXPONENTIAL DISTRIBUTION OF LIFETIMES,
by G. F. Rose and V. Rojansky. 8 Dec 59, 12p
STL/TN-59-0000-61356

Unclassified report

Descriptors: (*Satellites (Artificial), Life expectancy), Astronautics, Mathematical prediction, Probability, Statistical analysis.

This note describes a method for computing the answers to the following questions concerning the satellites described in the title: (a) What is the probability of having m live satellites in orbit immediately after the nth launch. (b) What is the probability of having m live satellites in orbit for the first time immediately after the nth launch. Question (b) arises, for example, when the task of putting up an initial set of m communication satellites is considered.

AD-607 375 Div. 12
OTS Prices: HC $2.00/MF $0.50

Caywood-Schiller Associates, Chicago, Ill.
ICBM TRAJECTORY DETERMINATION FROM OBSERVATIONS WITH ERRORS,
by James T. Morse. 1 Apr 60, 29p
Contract AF33 616 6276

Unclassified report

Descriptors: (*Guided missile trajectories, Determination), Guided missiles (Surface-to-surface), strategic weapons, Trajectories, Celestial mechanics, Momentum, Mathematical prediction, Stochastic processes, Numerical analysis, Errors, Theory.

By classical methods it is possible, at least in theory, to determine the trajectory of an object moving in a central gravitational field by passive observations of angular position. This method of trajectory determination was worked out and programmed for the case of observations made from a rotating earth. A computer program was developed for the calculation of observations of angular position and rate of change of range. Normally distributed errors were added to the computed observations in such a way that stochastically independent trajectory determinations could be made under the same circumstances. This resulted in a simulation of the operation of observing and determining the trajectory. Examples were computed to display the effect of observation errors on impact point determination.

AD-607 385 Div. 12, 13
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
A ONE-DIMENSIONAL ANALYSIS OF DUCTED SILOS AND A METHOD OF SCALING MODEL TEST DATA OF AIR ENTRAINMENT RATIO TO FULL SCALE,
by C. N. Tsu. 26 Aug 59, 26p STL/TR-59-0000-00795

Unclassified report

Descriptors: (*Guided missile launchers, Exhaust gases), (*Silos, Exhaust gases), Fluid dynamic properties, Wind tunnel models, One-dimensional flow, Mathematical analysis, Jet mixing flow, Ducts, Equations, Turbulence, Heat transfer, Thermal conductivity, Gas flow, Model tests, Scale.

Equations for the analysis of flow through ducted silos are presented. A method of scaling the sub-scale model test data of air entrainment ratio to full scale is indicated. Other known methods are also mentioned, and their merits discussed. (Author)

AD-607 302 Div. 13, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INCREASE IN THE RATE OF CONDENSATION IN AN ELECTRIC FIELD IN PRESENCE OF IONS,
by A. K. Zhebrovskii. 22 Sep 64, 9p
FTD TT64 548; TT 64 71566

Unclassified report

Unedited rough draft trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) 1964, v. 7, no. 2, p. 21-24.

Descriptors: (*Water vapors, Condensation), (*Condensers (Liquifiers), Electric fields), (*Refrigeration systems, Condensation), Freezing, Additives, Ions, Gas ionization, Electric discharges, Vapor pressure, Ice, Crystals, Nucleation, USSR.

Described are experiments on the condensation of water vapors into solid state upon introduction of ions into the condensator with simultaneous imposition of an electric field. It is shown, that the rate of condensation depends upon the pressure of the noncondensing gas, intensity of the electric field and amperage in the discharge.

MECHANICS OF ADHESIVE BONDED LAP-TYPE JOINTS: SURVEY AND REVIEW,
by Dieter Kutscha. Oct 64, 130p
Contract AF33 657 63 358, Proj. 7381, Task 738103
ML TDR64 298

Unclassified report

Descriptors: (*Bonded joints, Mechanical properties), (*Adhesives, Joints), Adhesion, Films, Failure (Mechanics), Elasticity, Stresses, Statistical analysis, Design, Reviews, Bibliographies.

The report presents a critical review made in the field of the design of adhesive bonded, lap-type joints. The study included a comprehensive survey and analysis of the literature pertaining to the theoretical and experimental analysis of lap joints, mechanical properties of adhesive film in joints, failure criteria for joints, and empirical methods of joint design. Based on the results of this survey, some recommendations are give for further research in this area. (Author)

AD-607 179 Div. 13, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
FUNDAMENTAL EQUATIONS OF THE THEORY OF ELASTIC SHELLS,
by I. M. Rapoport. 22 Sep 64, 9p
FTD TT64 588; TT 64 71550

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Doklady, 1963, v. 153, no. 5, p. 1027-1029.

Descriptors: (*Elastic shells, Mechanics), Elasticity, Theory, Dynamics, Differential equations, Structural shells, Mathematical analysis, USSR.

A method is presented for the solution of the three-dimension problem of the theory of elasticity for a body which has the form of a thin shell, by means of which it is possible in a relatively simple way to construct a self-adjoint system of differential equations of equilibrium for the shell of arbitrary configuration and varying thickness, without in so doing having recourse to any simplified hypotheses.

AD-607 188 Div. 13, 22
OTS Prices: HC $4.00/MF $1.00

RAND Corp., Santa Monica, Calif.
RESPONSE OF DRAG TYPE STRUCTURE TO BLAST,
by L. A. Gore and J. J. O'Sullivan. 16 Oct 53,
133p RM-1151

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nuclear explosion damage, Shock waves), (*Shock waves, Structures), (*Steel industry, Nuclear explosion damage), Pressure, Velocity, Loading (Mechanics), Blast, Vulnerability, Damage, Structural properties, Furnaces, Construction, Industrial equipment, Analysis.

The blast damage from a nuclear explosion on structures is considered. Two types of shock waves are discussed; the static overpressure or pressure rise, and the dynamic or drag pressure. The physical vulnerability of the component plants of steel works is presented, including the susceptibility of various structural or equipment units.

AD-607 213 Div. 13, 9
OTS Prices: HC $3.00/MF $0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
THE ENGINEERING APPLICATIONS OF A REPORT ENTITLED 'THE MOTIONS OF A MOORED CONSTRUCTION TYPE BARGE IN IRREGULAR WAVES AND THEIR INFLUENCE ON CONSTRUCTION OPERATION',
by W. J. Pierson, Jr. and P. Holmes. Aug 64, 55p
Proj. Y F015 01 01 001b
NCEL N604

Unclassified report

Descriptors: (*Construction, Barges), (*Barges, Hydrodynamics), Engineering, Mooring, Fluid dynamic properties, Design, Loading (Mechanics), Water waves.

The contents of the reference Report (AD-296 311) were summarized. The ways that this report can be used at three different levels of complexity were described. These three ways are (a) to determine the behavior of the particular barge of the report in the particular seaways treated in the report, (b) to determine the behavior of the particular barge of the report in seaways other than those treated in the report, and (c) to determine the behavior of barges of different design configurations in arbitrary seaways. The first way, (a), that this report can be used was illustrated by an example in which pertinent data were extracted from the report and discussed. The other two ways, (b) and (c), were described briefly. Were (b) and (c) developed further, their final output would be similar to that of (a). (Author)

AD-607 257 Div. 13
OTS Prices: HC $5.00/MF $1.00

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
ENERGY DISSIPATION AT STRUCTURAL JOINTS; MECHANISMS AND MAGNITUDES.
Rept. for Dec 62-Apr 64,
by Eric E. Ungar. Aug 64, 172p BBN-1137
Contract AF33 657 10125, Proj. 1370, Task 137005
FDL TDR64 98

Unclassified report

Descriptors: (*Joints, Vibration), (*Panels (Structural), Joints), Damping, Energy, Distribution, Frequency, Fastenings, Beams (Structural), Surfaces, Structural properties, Supports, Mathematical analysis.

A largely experimental study is described, which indicates that dissipation of vibratory energy at multi-point-fastened (bolted, riveted, spot-welded) joints connecting panels to stiffeners or to other panels, at frequencies considerably above the panel fundamental, is primarily due to the 'pumping' of air produced as adjacent surfaces between fasteners move away from and toward each other. A study of the energy dissipation characteristics of plate-strips whose ends are bolted to rigid supporting structures is discussed. From comparison of data obtained by direct measurement of energy dissipation with analysis for a number of possible mechanisms it is concluded that interface slip plays a minor role in such bolted joints. Damping here appears to be primarily associated with relative motions normal to the mating surfaces. (Author)

AD-606 980 Div. 14, 25
OTS Prices: HC $2.00/MF $0.50

Utah Univ., Salt Lake City.
THE EFFECTS OF SURFACE CONDITION AND CHEMICAL ENVIRONMENT ON THE DEFORMATION AND FRACTURE PROCESSES OF CERAMIC MATERIALS.
Rept. for 1 Dec 62-31 May 64,
by O. W. Johnson and P. Gibbs. Aug 64, 49p
Contract AF33 657 10398, Proj. 7350, Task 735001
ML TDR64 186

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Rutile, Mechanical properties), (*Ceramic materials, Mechanical properties), (*Deformation, Ceramic materials), (*Fracture (Mechanics), Ceramic materials), (*Germanium, Fracture (Mechanics)), Surface properties, Environmental test, Oxygen, Nitrogen, Argon, Titanium compounds, Oxides, High-temperature research, Impurities, Crystals, Stresses, Mathematical analysis, Crystal lattice defects, Diffusion, Lithium, Solubility, Nucleation, Heat of activation, Optical analysis.

Results obtained in study of high temperature deformation of rutile (TiO2) are briefly summarized. Refined sample preparation techniques, which have resulted in a significant reduction in scatter of fracture strength data, are described. Atmosphere during surface damaging, for atmospheres of O2, N2 and A, have been found to have no detectable effect on subsequent fracture strength. Influence of impurities on fracture has been further examined; results were negative for the impurities studied. Measurements of dislocation velocities in Ge crystals below 325C are reported, at resolved shear stresses as high as 60 kg/sq. mm. No drastic departures from known behavior at higher temperatures and lower stresses were observed. The diffusion of interstitial Li in rutile (TiO2) was measured over a temperature range of 80 - 360C, utilizing the optical absorption associated with the Li impurity as a measure of its concentration. Diffusion was found to be strongly anisotropic with diffusion coefficient D perpendicular to the C-axis smaller than D parallel by a factor of at least 10 to the 8th power up to 550C. Concentrations and solubility of Li in rutile were measured approximately using chemical analysis. Lattice distortion and other impurities strongly inhibit Li diffusion.

AD-607 040 Div. 14, 25
OTS Prices: HC $1.00/MF $0.50

General Electric Co., Cincinnati, Ohio.
INFLUENCE OF STRESS CORROSION ON STRENGTH OF GLASS FIBERS.
Bi-monthly progress rept. no. 3,
by D. L. Hollinger, W. G. Kanetzky, and H. T. Plant.
30 Sep 64, 12p
Contract Nonr4486 00X

Unclassified report

Descriptors: (*Glass textiles, Corrosion), (*Corrosion, Glass textiles), (*Stresses, Corrosion), Glass, Filaments, Low-temperature research, Statics, Fatigue (Mechanics), Loading (Mechanics).

Initial static fatigue tests at liquid nitrogen temperature on single filaments of E-glass yielded incomplete data because of frost build-up problems. It became necessary to isolate the equipment from room humidity. This has been done and low temperature testing has resumed successfully, with delayed failure data accumulating at a satisfactory rate. The results so far indicate that even with the very high rates of loading used in these tests, the stress level at which most fibers will fail immediately is lower at room temperature and normal humidity than at liquid nitrogen temperature. Gradually raising the temperature from liquid nitrogen temperature causes the failure of fibers which have been supporting a given load at -196C. The implication is that the processes involved in static fatigue are greatly slowed down, but not completely eliminated, by lower temperatures in the range from room temperature to -196C. Complete static fatigue results at -196C are not yet available. (Author)

AD-607 076 Div. 14, 4
OTS Prices: HC $2.00/MF $0.50

West Virginia Pulp and Paper Co., Charleston, S. C.
ADSORPTION-DESORPTION PROPERTIES OF SORBENTS.
Bimonthly progress rept. no. 5, 19 Jul-18 Sep 64,
by A. W. Loven and F. J. Vermillion. 6 Oct 64, 28p
Contract DA18 035AMC106A

Unclassified report

Descriptors: (*Adsorption, Materials), (*Carbon, Adsorption), Fibers (Synthetic), Viscose, Rayon, Coal, Porosity, Density, Charcoal, Calibration, Powders, Chromatographic analysis, Sorption.

Water adsorption and desorption isotherms at 25C are reported for a coal-base granular activated carbon, activated carbon, activated carbon fibers made from Fortisan and viscose rayons, and highly activated coconut shell charcoals. Isotherm shapes correlate well with pore structures. Observed saturation capacities for water imply that the density of adsorbed water is approximately 10% less than that of liquid water. Further adsorption and desorption isotherms of dimethyl methylphosphonate, DMMP, on a highly activated coconut shell charcoal are reported. These measurements confirm a previously reported reduction in DMMP capacity upon grinding the granular sample to a fine powder. Isosteric heats of adsorption of DMMP on the coconut shell charcoals are seen to be significantly lower than on the other carbons listed above which were previously studied. This is consistent with observed differences in pore structure and isotherm steepnesses among the samples. Apparatus has been installed and calibrated for flow adsorption evaluation of sorbent pads. This embodies a converted E-2 canister tester in conjunction with a gas chromatograph. A gas chromatographic method for the determination of low concentrations of DMMP in air is described. (Author)

AD-607 078 Div. 14
OTS Prices: HC $4.00/MF $0.75

Boeing Co., Seattle, Wash.
EVALUATION OF IMPREGNATED POROUS REFRACTORY OXIDE COMPOSITES.
Final rept. for 1 Jul 63-30 Jun 64,
by F. N. Breslich, Jr. and L. M. Stejskal. May 64,
110p
Contract AF33 657 11222, Proj. 7381, Task 738101
ML TDR64 185

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Refractory materials, Foams), (*Composite materials, Refractory materials), (*Porous materials, Refractory materials), Zirconium compounds, Magnesium compounds, Oxides, Expanded plastics, Phenolic plastics, Impregnation, Plasma jets, Nose cones, Ablation.

14. Materials (Non-Metallic)

AD-606 883 Div. 14, 25
OTS Prices: HC $3.00/MF $0.75

Systems Research Lab., Inc., Dayton, Ohio.
THE ELECTRICAL BEHAVIOR OF REFRACTORY OXIDES II.
Interim technical rept. for 1 Feb 63-15 Feb 64,
by R. W. Vest, J. A. Crawford, and W. C. Tripp.
Aug 64, 74p
Contract AF33 657 10815, Proj. 7022, Task 7022 02
ARL 64 122

Unclassified report

Descriptors: (*Refractory materials, Oxides), (*Electrical properties, Refractory materials), Electrical conductance, Dielectric properties, Transport properties, Optical properties, Photoconductivity, Electron microscopy, Mathematical analysis, Instrumentation, Computers, Balances, Zirconium compounds.

The research was directed toward achieving a more fundamental understanding of charge and mass transport mechanisms in refractory metal oxides. Special research apparatus and instrumentation was developed in order to carry out the experimental program. A computer-oriented study was conducted to assist in the analysis of dielectric loss data. The program was shown to be successful with a representative set of experimental measurements. The defect structure of monoclinic zirconia was investigated by measuring the oxygen partial pressure dependence of the electrical conductivity and sample weight. Techniques were developed to calculate the degree of non-stoichiometry and the mobility of the charge carriers from electrical and weight change data. ZrO2 was found to be an amphoteric semiconductor at 1000 C with the transition from n-type to p-type conductivity occurring at 10 to the minus 16th power atmospheres. The predominant defect in the oxygen excess region was shown to be completely ionized zirconium vacancies. The positive holes arising from the zirconium vacancies were found to have an extremely small mobility. (Author)

AD-606 892 Div. 14
OTS Prices: HC $4.00/MF$0.75

National Carbon Co., Lawrenceburg, Tenn.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME XXXIV. OXIDATION-RESISTANT COATINGS FOR GRAPHITE.
Rept. for Dec 61-Mar 63,
by D. A. Schulz, P. H. Higgs and J. D. Cannon.
Jul 64, 122p
Contract AF33 616 6915, Projs. 7350, 7381,
Tasks 735002, 738102
WADD TR61 72 V34

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Graphite, Coatings), (*Refractory materials, Antioxidants), (*Antioxidants, Coatings), (*Coatings, Graphite), Oxidation, Heat-resistant materials, Thermodynamics, Titanium compounds, Borides, Boron compounds, Silicides, Ceramic coatings, Magnesium compounds, Oxides, Dioxides, Zirconium compounds, Calcium compounds, Strontium compounds.

The refractory materials that could be used for high-temperature, oxidation-resistant coatings for graphite are reviewed. A study of these materials shows which are thermodynamically stable when applied directly to graphite and those which are thermodynamically stable when an intermediate coating is applied between an oxidation-resistant outer coating and the graphite. Calculations are made showing that, with properly selected intermediate reaction barriers, many very refractory oxides, such as thoria, can be used as coatings at temperatures up to their melting points. The application of TiB2, B6Si, MgO,ZrO2, CaZrO3 and SrZrO3 coatings by arc-plasma spraying is described and the results of oxidation studies to determine the protection afforded graphite by these coatings are presented. Coating of TiC-TiN and SiC-Si applied to graphite by vapor deposition using the source-target method are discussed. Techniques of applying SiC coatings by pack-diffusion methods are reported and the oxidation protection afforded by the coatings is compared with that of the SiC produced by the source-target method. (Author)

AD-606 963 Div. 14, 25
OTS Prices: HC $2.00/MF $0.50

Midwest Research Inst., Kansas City, Mo.
A STUDY OF THE PHYSICAL BASIS OF THE MECHANICAL PROPERTIES OF CERAMICS.
Rept. for 18 Apr 63-15 Mar 64,
by Gordon E. Gross and Paul L. Gutshall. Apr 64, 43p
Contract AF33 657 8572, Proj. 7350, Task 735003
ASD TDR63 605 P2

Unclassified report

See also AD-416 036.

Descriptors: (*Ceramic materials, Crystal lattices), (*Crystal lattices, Mechanical properties), (*Dielectrics, Mechanical properties), Beryllium, Hall effect, Strain (Mechanics), Microstructure, Single crystals, Crystal structure, Sodium compounds, Chlorides, Surface properties, Plasticity, Germanium, Light, Damping, Ductility, Brittleness, Absorption.

The investigation of the mechanical properties of ceramics as related to their electronic structure is continued. The optical-mechanical properties of germanium have been studied and experimental results are presented for internal friction and bending tests conducted in the presence of infrared irradiation. The cleavage energy of sodium chloride is given as a function of F-center density and testing environment. The cleavage energy of sodium chloride colored by diffusion increases by two at a density of 10 to the 16th power F-centers/cc, with no apparent increase in the elastic modulus. Experimental results are given for Hall coefficient measurements on beryllium. (Author)

AD-606 964 Div. 14, 4
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
WAYS OF USING CARBON FLUORIDES AND CARBON CHLOROFLUORIDES AS HIGHLY-STABLE INSTRUMENT OILS,
by G. I. Fuks and M. M. Blekherov. 2 Jan 64, 16p
FTD MT63 158; TT 64 71514

Unclassified report

Edited machine trans. of Khimiya i Tekhnologiya Topliv i Masel (USSR) 1963, v. 8, no. 7, p. 58-62.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Lubricants, Fluorocarbons), (*Oils, Fluorocarbons), (*Fluorocarbons, Lubricants), (*Fluorochlorides, Lubricants), Stability, Carboxylic acids, Solubility, Colloids, Lubricant additives, Surface-active substances, USSR.

by M. B. Fromberg, K. A. Andrianov, N. M. Pavlushkin, K. I. Zabyrina, and Yu. K. Petrashko. 29 Sep 64, 6p
FTD TT64 603; TT 64 71548

Unclassified report

Unedited rough draft trans. of Russian patent 148 181 (appl. 736544/23-4, 29 Jun 61).

Descriptors: (*Refractory coatings, Preparation), (*Heat-resistant plastics, Plastic coatings), (*Plastic coatings, Preparation), Siloxanes, Glass, Oxides, Peroxides, Polymerization, Synthesis (Chemistry), Patents, USSR.

A method of preparing heat resistant coatings is given which is characterized by the fact that elemento-organic oligomers are used with functional groups (for example: tris-(alpha, omega-hydroxymethylsiloxy)-phenylsiloxane). A mixture consisting of an elemento-organic compound is prepared containing a greater amount of chemically active groups in the form of hydroxyl, alkoxyl etc., an inorganic glass (boronlead, phosphate and other glass); and hydroxyl compounds of such elements, as boron, phosphorus etc. When heated, the functional groups of the polymers and glass react with each other forming block and acclimatized polymers with melting points of more than 500C.

AD-607 195 Div. 14, 27
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
EFFECT OF SURFACE TREATMENTS ON THE MECHANICAL BEHAVIOR OF FILLED RUBBER.
Final rept.,
by Daniel R. Mulville and Irvin Wolock. Aug 64, 25p
Task 71402
NRL MR1563

Unclassified report

Descriptors: (*Rubber, Mechanical properties), (*Synthetic rubber, Mechanical properties), (*Rocket components, Rubber), Combustion chambers, Thermal insulation, Surface properties, Coatings, Adhesives, Epoxy plastics, Loading (Mechanics), Brittleness, Ductility, Transition temperature, Tensile properties, Impact shock.

Tests were conducted to determine the effects of high rates of loading and of typical adhesives on the mechanical behavior of EP-87 rubber, a filled rubber used as insulation in rocket chambers. It was found that the higher rate of loading studied did not affect the brittle-ductile transition temperature, but it did make the rubber more sensitive to a surface notch. It was also found that standard epoxy adhesives applied to the surface of this material: (a) reduce the tensile elongation from approximately 200% for the control material to one to two percent for the coated material; (b) reduce the Charpy impact strength from approximately nine ft-lb for the control material to one to two ft-lb for the coated material; (c) increase the brittle-ductile transition temperature from approximately 40F for the control material to approximately 80F for the coated material. Shallow surface notches or scratches have a similar effect on the impact strength and transition temperature. A flexible adhesive, however, has little or no effect on the mechanical behavior of this same material. (Author)

AD-607 240 Div. 14, 27
OTS Prices: HC $4.00/MF $0.75

Monsanto Research Corp., Dayton, Ohio.
EVALUATION OF ELASTOMERS AS O-RING SEALS FOR LIQUID ROCKET FUEL AND OXIDIZER SYSTEMS.
Rept. for Mar 63-Mar 64,
by Carmen L. Bellanca, Ival O. Salyer and Jay C. Harris.
Aug 64, 102p
Contract AF33 616 8483, Proj. 7381, Task 738103
ASD TDR63 496 P2

Unclassified report

Descriptors: (*Fuel seals, Liquid rocket fuels), (*Elastomers, O-rings), (*O-rings, Fuel seals), Polyethylene plastics, Halocarbon plastics, Butyl rubber, Silicones, Plastics, Cladding, Encapsulation, Metal coatings, Liquid rocket oxidizers, Degradation, Test methods, Rocket propellants, Oxidation, Performance (Engineering), Fuel systems, Nitrogen compounds, Oxides, Hydrazine, Hydrogen peroxide, Chlorine Trifluoride.

O-Ring seals of selected elastomeric and compliant materials were evaluated for resistance to liquid rocket fuels in a simulated end-use test. The candidate elastomers were placed under compression in closed cells and exposed to the liquid and vapor of liquid rocket fuels and oxidizers for extended periods of time. Rate of fuel loss through the seal, and the change in physical properties of the seal materials were determined. Nitrogen tetroxide, mixed hydrazines, chlorine trifluoride, 90% hydrogen peroxide, Hybaline A-5, and pentaborane were tested in direct contact with the O-ring seals at 73F. Metal clad and polyethylene encapsulated elastomeric O-rings were also tested for resistance to nitrogen tetroxide at 73F. The effect of temperature on elastomer endurance was determined by exposing the O-rings to nitrogen tetroxide, mixed hydrazines, and hydrogen peroxide at 160F. The effect of direct immersion in liquid rocket fuels on the physical properties of the seal materials was investigated by immersing promising O-ring candidates in nitrogen tetroxide, hydrogen peroxide, and mixed hydrazines. (Author)

AD-607 241 Div. 14, 25, 26
OTS Prices: HC $2.00/MF $0.50

National Carbon Co., Lawrenceburg, Tenn.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. SUPPLEMENT TO VOLUME VII. HIGH-DENSITY RECRYSTALLIZED GRAPHITE BY HOT FORMING.
Rept. for Sep 61-May 62,
by G. L. Rowe and M. B. Carter. Aug 64, 42p
Contract AF33 616 6915, Projs. 7350, 7381,
Tasks 735002, 738102
WADD TR61 72 V7 suppl.

Unclassified report

Descriptors: (*Refractory materials, Graphite), (*Graphite, Hot-working), (*Hot-working, Graphite), Density, Recrystallization, Carbon, Machine tools, Microstructure, Resistance (Electrical), Elasticity, Plasticity, Compressive properties, Thermal expansion, Physical properties, Temperature, Pressure.

This report describes the development and fabrication techniques utilized in the scale-up of grades ZTE and ZTF graphite to 30-inch diameter sizes. Grades ZTE and ZTF graphite which are normally characterized by a bulk density range of 1.92 to 1.97 g/cc and 1.97 to 2.02 g/cc, respectively, are manufactured by hot working grade RVA graphite which is characterized by a bulk density of 1.84 g/cc under pressures as high as 3500 lbs./sq. in. and temperatures up to 3000C. The physical properties of a 30-inch diameter ZTE graphite billet are tabulated along with the properties of RVA graphite. (Author)

AD-607 276 Div. 14
OTS Prices: HC $5.00/MF $1.00

Westinghouse Electric Corp., Lima, Ohio.
HIGH TEMPERATURE ALKALI METAL RESISTANT INSULATION.

AD-607 084 Div. 14
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
THE DOUBLE REFRACTION OF RUBBER IN THE DEFORMED AND IN THE UNDEFORMED STATE,
by M. Kroeger. 24 Sep 64, 13p
RSIC 289; TT 64 71519

Unclassified report

Trans. of Kolloid-Zeitschrift und Zeitschrift fur Polymere (Germany) 1928, v. 45, p. 52-56.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Rubber, Elasticity), Photoelasticity, Deformation, Strain (Mechanics), Stresses, Density, West Germany.

Crude rubber becomes double refracting during storage. Longitudinal elongation leads to positive biaxial double refraction. The determination is unambiguous if it is possible to perform the observations in the direction of the stretching. In the case of vulcanized rubber only positive uniaxial or biaxial double refraction can be considered. The lamellar deformation leads in all cases to weak negative biaxial double refraction. (Author)

AD-607 107 Div. 14, 25
OTS Prices: HC $1.00/MF $0.50

Polymer Research Inst., Univ. of Massachusetts, Amherst.
DYNAMIC DICHROISM OF DYED POLYMER FILMS II.
Technical rept. no. 73,
by R. Yamada and R. S. Stein. Aug 64, 15p
Contract Nonr3357 01, Proj. NR056 378

Unclassified report

Partly supported by grants from the Army Research Office, Durham N.C., and the Petroleum Research Fund. See also AD 603 063.

Descriptors: (*Polymers, Optical properties), (*Nylon, Optical properties), Dyes, Films, Refraction, Deformation, Strain(Mechanics), Crystal substructure, Vibration, Stresses.

AD-607 149 Div. 14, 17
OTS Prices: HC $1.00/MF $0.50

Marine Engineering Lab., Annapolis, Md.
THE RESISTANCE OF BERYLLIUMIZED SURFACES TO HIGH TEMPERATURE SLAG CORROSION.
Research and development rept.,
by W. J. Greenert. 22 Oct 58, 19p
Proj. NS013 120
MEL 910088

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Beryllium, Corrosion inhibition), (*Metal coatings, Beryllium), Stainless steel, Nickel alloys, Chromium alloys, Cobalt alloys, Iron alloys, Tungsten alloys, Corrosion, High-temperature research, Slags, Surfaces, Metallography oxidation, Microstructure, Diffusion, Protective treatments, Fuels, Vanadium.

Beryllium diffused surfaces on Type 310 stainless steel, Inconel, and Haynes Stellite 31 were evaluated for resistance to fuel-oil-ash slags at elevated temperature. Considerable improvement in resistance to corrosion caused by vanadium bearing slags was induced in the stainless steel. However, a decreased resistance to sulfatechloride corrosion was shown by all surfaces, while the over-all resistance of the Haynes Stellite was significantly reduced by the beryllium izing process. A metallographic examination of the coatings is presented. (Author)

AD-607 150 Div. 14, 13, 17
OTS Prices: HC $1.00/MF $0.50

Marine Engineering Lab., Annapolis, Md.
INVESTIGATION OF REMEDIAL MEASURES FOR COMBATING ACCELERATED OXIDATION INDUCED BY VANADIUM CONTAMINATION.
Rept. no. 2,
by W. J. Greenert and L. G. Richards. 4 Sep 56, 19p
Proj. NSM013 120
MEL 040088

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Boilers, Corrosion inhibition), (*Steel, Corrosion inhibition), (*Vanadium, Contamination), (*Corrosion inhibition, Coatings), Fuels, Impurities, Nickel alloys, Chromium alloys, Oxidation, Alkaline earth oxides, Magnesium compounds, Calcium compounds, Oxides, Slags, Solubility.

The oxidation characteristics of vanadium contaminated surfaces as affected by various treatments are described. It was found that coatings of the alkaline earth oxides substantially reduce the corrosion of 25-20 chromium-nickel steel. Treatments are described in sufficient detail to permit the development of procedures for applying the remedial substance to an actual boiler. (Author)

AD-607 173 Div. 14, 25
OTS Prices: HC $3.00/MF $0.75

New York State Coll. of Ceramics, Alfred Univ.
THE STRESS-STRAIN BEHAVIOR OF STRONTIUM ZIRCONATE.
Final technical rept. for 15 Sep 63-15 Sep 64,
by J. E. Funk, J. Nemeth, and J. R. Tinklepaugh.
15 Sep 64, 93p
Contract NOw64 0051d

Unclassified report

Descriptors: (*Ceramic materials, Deformation), (*Strontium compounds, Zirconates), Stresses, Strain (Mechanics), Mechanical properties, Crystal structure, Single crystals.

The mechanical yield of polycrystalline $SrZrO_3$ at room temperature appears to be related to a domain motion or crystal twinning similar to that which takes place in ferroelectric $BaTiO_3$ under an electric stress. This theory was supported by comparing experimentally determined yield to the expected yield from crystallographic considerations. Small single crystals were grown and photographs further revealed a laminar structure taken to be similar to those known to exist in $BaTiO_3$. This further supports the theory presented. (Author)

AD-607 182 Div. 14, 4
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF PREPARING HEAT-RESISTANT COATINGS,

Descriptors: (*Fiber optics, Infrared radiation), (*Infrared optical materials, Fiber optics), Glass, Germanium, Selenium, Arsenic, Antimony, Tellurium, Silicon, Light transmission, Reviews, Glass textiles, Fibers, Drawing (Machine processing).

The results of a literature survey for glasses with longer wavelength infrared transmission than arsenic-sulphur glasses are described in detail. The conclusions of this survey are discussed and samples were obtained of some of the selected glasses. The equipment necessary for this program is described and progress on its fabrication reported. Preliminary attempts to draw fibers with the available samples using existing fiber drawing equipment indicated that closer environmental control is necessary to produce seed-free fibers. This was anticipated, and new equipment is now being built. (Author)

AD-607 355 Div. 14
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
POLYURETHANE LININGS FOR STEEL FUEL-STORAGE TANKS.
Interim rept.,
by J. R. Griffith and G. E. Rohl. 15 Oct 64, 16p
Proj. YF015 05 01 001
NRL 6139

Unclassified report

Descriptors: (*Plastic coatings, Fuel tanks), (*Storage tanks, Plastic coatings), (*Isocyanate plastics, Plastic coatings), Steel, Degradation, Carbon dioxide, Films.

Polyurethanes are among the few types of organic materials which are suitable for use in coating form as linings for large, steel fuel-storage tanks. Such linings have been in service in shore tanks of the Navy for five years, and have given satisfactory performance. However, in the bottom areas, where the linings are exposed to water, blistering has occurred. The blisters are tough, liquid-filled hemispheres, which generally develop within the layers of the coating. Upon the basis of numerous immersion experiments, it is suggested that there are sites within polyurethane coatings which are particularly subject to blister initiation. Evidence has been collected to indicate that these sites may be minute, carbon dioxide bubbles formed by side reactions of the coating components. Several means of reducing the numbers and sizes of blisters have been found, and work is in progress to prevent the blister formation completely. (Author)

Quarterly progress rept. no. 2,
by W. H. Snavely, R. E. McVay, Sr., R. E. Stapleton, R. J. Towner, and J. W. Ogden, Sr. 10 Oct 64, 161p
WAED64-56E
Contract AF33 615 1360, Proj. 8128, Task 8128 06
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electric insulation, Heat-resistant materials), (*Transformers, Corrosion inhibition), (*Potassium, Corrosive gases), Ceramic materials, Electric terminals, Resistance (Electrical), Joints, Metalation, Sintering, Composite materials, Coils, Tests, Welding, Production.

Selected materials were exposed to potassium vapor at 850C. Materials were selected from this group for a transformer test device. Preliminary transformers were fabricated for electrical testing in potassium vapor. Several types of ceramic-to-metal seals were obtained or fabricated for use as electrical terminal seals in potassium exposure capsules. (Author)

AD-607 282 Div. 14, 25
OTS Prices: HC $1.50/MF $0.75

General Electric Co., Schenectady, N. Y.
DEFORMATION MECHANISMS OF REFRACTORY AND OTHER MATERIALS.
Final rept.,
by W. G. Johnston and J. S. Nadeau. Aug 64, 58p
Contract AF33 616 7942, Proj. 7021, Task 702105
ARL 64 135
Unclassified report

Descriptors: (*Refractory materials, Deformation), (*Deformation, Materials), Aluminum compounds, Oxides, Single crystals, Magnesium compounds, Halides, Alkali metal compounds, Shear stresses, Impurities, Crystal lattice defects, Hardness, Stresses, Optical analysis, Sodium compounds, Chlorides, Lithium compounds, Fluorides, Temperature.

This report covers an experimental study of the dynamical flow properties of Al2O3 single crystals at elevated temperatures, and several aspects of deformation behavior of other nonmetallic crystals, principally MgO and alkali halides. The work includes an investigation of the flow stress of pure and doped alkali halides, in the temperature range of 20.5 to 300K. Most of the work with doped crystals has been in crystals of NaCl and LiF containing divalent impurities present and impurity-vacancy pairs. The flow stress at low temperature (20.5K) is compared with Fleischer's theory of hardening by defects that produce tetragonal distortions. The effect of heat treatment on doped crystals is described, as well as the effect of OH(-) or F(-) ions in NaCl doped with devalent metal impurities. An experiment is described in which an attempt was made to align, by means of optical techniques, the defects produced by irradiation in alkali halides. Further experiments on strain rate sensitivity are described for pure, doped and radiation-hardened crystals. A comparison is made between indentation hardness measurements and flow stress measurements in alkali halide crystals, and the pronounced differences in the two types of measurements are discussed. (Author)

AD-607 284 Div. 14
OTS Prices: HC $3.00/MF $0.50

Wyandotte Chemicals Corp., Mich.
SYNTHESIS OF LOW TEMPERATURE OIL RESISTANT URETHANE ELASTOMERS.
Quarterly progress rept. no. 6, 15 May-31 Aug 64,
by S. L. Axelrood and W. J. Lajiness. 31 Aug 64, 52p
Contract DA20 018ORD24883
Unclassified report

See also AD-421 811.

Descriptors: (*Elastomers, Low-temperature research), (*Synthesis (Chemistry), Elastomers), Glycols, Mechanical properties, Oils, Isocyanate plastics, Organic compounds, Tensile properties, Elasticity, Stresses, Polymerization, Molecular weight.

Cast urethane-urea elastomers were prepared from blends of high molecular weight polyethers and polytetramethylene ether glycols which meet the mechanical strength, compression set at 100C and low temperature flexibility at -55C (-67F) requirements of the contract. This leaves only the ASTM No. 3 oil resistance requirement to be satisfied. Work has continued on evaluation of various diisoycanates, diamines, and low molecular weight chain extenders in the elastomer formulations. Also, a 4700 molecular weight polyether diol was evaluated. (Author)

AD-607 295 Div. 14, 4
OTS Prices: HC $3.00/MF $0.75

Union Carbide Plastics Co., Bound Brook, N. J.
RESEARCH ON IMPROVED EPOXY RESINS.
Quarterly progress rept. no. 6 (Summary rept., Phase I and II),
by J. R. Harvey, W. P. Mulvaney, R. F. Sellers and S. G. Smith, Jr. 1 Oct 64, 62p
Contract Nonr4172 00X
Unclassified report

See also AD-603 748.

Descriptors: (*Filament wound construction, Binders), (*Epoxy plastics, Physical properties), Cyclopentanes, Cyclopentenes, Phenols, Ethers, Molecular structure, Compressive properties, Tensile properties, Fracture (Mechanics), Shear stresses, Hardening, Laminated plastics, Pressure vessels.

The purpose of the program is to define the correlation of novel polyepoxide molecular configurations with the physical properties of cured resins as the initial step in providing significant improvements in filament reinforced plastics for deep submergence structures. A discussion of the progress is presented relating the physical properties of cured specimens to the fourteen different types of molecular configurations investigated since the start of the program. The performance of each general configuration is discussed separately within the report and the known effects of resin quality, modifications, specimen preparation, and resin/hardener stoichiometry are included. (Author)

AD-607 323 Div. 14, 25
OTS Prices: HC $2.00/MF $0.50

Optics Technology, Inc., Belmont, Calif.
LONG WAVELENGTH INFRARED FIBER OPTICS.
Interim engineering rept. no. 1, 15 Jun-15 Sep 64.
Sep 64, 36p
Contract AF33 615 1952, Proj. 4056, Task 405603
Unclassified report

In this paper, the author establishes an analogue of an integral representation for positive definite hermitian matrices. This result is then used to derive a number of known inequalities and to obtain various generalizations.

AD-606 921 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE APPLICATION OF DYNAMIC PROGRAMMING TO A CLASS OF IMPLICIT VARIATIONAL PROBLEMS,
by Richard Bellman and John M. Richardson.
14 May 58, 16p P-1374
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Dynamic programming, Calculus of variations), (*Control systems, Dynamic programming), Vector analysis, Functions, Equations, Difference equations, Probability, Statistical distributions, Linear systems.

AD-606 923 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CONSENSUS OF SUBJECTIVE PROBABILITIES: THE PARI-MUTUEL METHOD,
by Edmund Eisenberg and David Gale.
22 May 58, 10p P-1379
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Game theory, Probability), (*Probability, Game theory), Calculus of variations, Theorems.

Under the pari-mutuel system of betting on horse races the final track's odds are in some sense a consensus of the 'subjective odds' of the individual bettors weighted by the amounts of their bets. The properties which this consensus must possess and prove that there always exists a unique set of odds having the required properties are formulated. (Author)

AD-606 927 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
RE-INTERPRETATION OF THE SOLUTION CONCEPT FOR 'NON-COOPERATIVE' GAMES,
by T. C. Schelling. 2 Jun 58, 18p P-1385
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Game theory, Matrix algebra), Mathematics.

AD-606 928 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FOR THE ABANDONMENT OF SYMMETRY IN THE THEORY OF COOPERATIVE GAMES,
by T. C. schelling. 29 May 58, 30p P-1386
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Game theory, Mathematical logic), (*Mathematical logic, Game theory), Operations research, Theory.

The first part of this paper argues that the pure, 'moveless' bargaining game analyzed by Nash, Harsanyi, Luce and Raiffa, and others, may not exist or, if it does, is of a different character from what has been generally supposed; the point of departure for this argument is the operational meaning of agreement, a concept that is almost invariably left undefined. The second part of the paper argues that symmetry in the solution of bargaining games cannot be supported on the notion 'rational expectations'; the point of departure for this argument is the operational identification of irrational expectations. (Author)

AD-606 929 Div. 15, 20
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INVARIANT IMBEDDING AND GENERALIZED TRANSPORT THEORY; A BASIC STOCHASTIC FUNCTIONAL EQUATION,
by Richard Bellman, Robert Kalaba, and G. Milton Wing.
3 Jun 58, 8p P-1390
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Equations, Stochastic processes), (*Neutron transport theory, Invariance), Statistical processes, Probability, Geometry, Functions, Transport properties, Neutrons.

The aim of the present paper was to extend previous results and techniques so as to include an extensive category of transport processes involving both deterministic and stochastic interaction, general geometries, and the determination of characteristic functions and probabilities as well as fluxes, which is to say, expected values. Utilizing the principle of invariant imbedding, a basic stochastic functional equation was derived. From this equation appropriately specialized, can be obtained all the relations pertaining to fluxes contained in previous papers, and in addition corresponding relations for characteristic functions.

AD-606 931 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SOLUTIONS OF A SYMMETRIC MARKET GAME,
by L. S. Shapley. 5 Jun 58, 32p P-1392
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Game theory, Economics), (*Economics, Game theory), Functions, Set theory, Mathematical analysis.

Solutions are obtained to a symmetrical market game in which the value of a coalition is assumed to be proportional to the number of buyers or sellers participating, whichever is smaller.

AD-606 935 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.

15. Mathematics

AD-606 900 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
LEAST SQUARES ESTIMATION IN FINITE PROCESSES,
by Albert Madansky. 5 May 58, 14p P-1358
Unclassified report

Descriptors: (*Statistical processes, Least squares method), (Least squares method, Statistical processes), Probability, Sampling, Matrix algebra, Statistical tests, Theorems.

A consistent estimate of the transitional probability matrix of a finite Markov process is given in the case when at each point in time only the proportions of the sample in each state are known. It is shown that this estimate is asymtotically more efficient, in a sense defined in the paper, than previously considered estimates for this matrix. (Author)

AD-606 903 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE SHORTEST ROUTE THROUGH A NETWORK,
by George B. Dantzig. 12 Apr 58, rev. 29 Apr 59,
8p P-1345
Unclassified report

Descriptors: (*Linear programming, Numerical methods and procedures), Optimization, Operations research.

The chief feature of the method is that it fans out from the origin working out the shortest path to one new node from the origin and never having to backtrack. No more than n(n-1)/2 comparisons are needed to find the shortest route from a given origin to all other nodes and possibly less between two fixed nodes. Except for details and bias of various authors towards a particular brand of proof, this problem has been solved the same way by many authors. This paper refines these proposals to give what is believed to be the shortest procedure for finding the shortest route when it is little effort to arrange distances in increasing order by nodes or to skip consideration of arcs into nodes whose shortest route to the origin has been determined earlier in the computation. In practice the number of comparisons is much less than indicated bounds because all arcs leading to nodes previously evaluated are deleted from further consideration. A further efficiency can be achieved in the event of ties by including least distances from origin to many nodes simultaneously during the fanning out process. However, these are shown as separate steps to illustrate the underlying principle. (Author)

AD-606 905 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME FINITE POPULATION UNBIASED RATIO AND REGRESSION ESTIMATORS,
by M. R. Mickey. 25 Apr 58, 40p P-1348
Unclassified report

Prepared in cooperation with Iowa State Coll.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Population (Mathematics), Sampling), (*Monte Carlo methods, Statistical analysis), Probability, Analysis of variance, Stochastic processes, Population, Numerical analysis, Permutations, Mathematical prediction.

A class of ratio and regression type estimators is given such that the estimators are unbiased for random sampling, without replacement, from a finite population. Non-negative, unbiased estimators of estimator variance are provided for a subclass. Similar results are given for the case of generalized procedures of sampling without replacement. Efficiency is compared with comparable estimation sample selection methods for this case.

AD-606 910 Div. 15
OTS Prices: HC $1.00/MF $0.50

Rand Corp., Santa Monica, Calif.
ON THE MAXIMUM LIKELIHOOD ESTIMATE OF THE CORRELATION COEFFICIENT,
by Albert Madansky. 30 Apr 58, 8p P-1355
Unclassified report

Descriptors: (*Statistical functions, Analysis of variance), (*Analysis of variance, Statistical functions), Statistical analysis, Numerical methods and procedures.

The maximum likelihood estimate of the correlation coefficient is obtained for the bivariate normal distribution when the variances are known. (Author)

AD-606 911 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON 'HEURISTIC PROBLEM SOLVING' BY SIMON AND NEWELL,
by Richard Bellman. 29 Apr 58, 4p P-1356
Unclassified report

Commentary on article 'Hueristic Problem Solving' pub. in JORSA, 1958, v. 6, p. 1-10.

Descriptors: (*Numerical methods and procedures, Reviews), Mathematics, Theory.

A polemic on an article by Simon and Newell, Heuristic Problem Solving, in which four predictions are made concerning the usage of computers within ten years, predictions concerning the discovery of important mathematical theorems, the writing of worthwhile music, the future dependence of the major part of the field of psychology upon computers, and the dethroning of the current world chess champion by a computer.

AD-606 913 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
REPRESENTATION THEOREMS AND INEQUALITIES FOR HERMITIAN MATRICES,
by Richard Bellman. 6 May 58, 14p P-1361
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Integrals, Theorems), (*Inequalities, Matrix algebra), (*Matrix algebra, Inequalities), Algebra, Integration, Conformal mapping, Complex numbers, Real numbers.

a known mean. The table is used as follows: Q is the ratio of Limit observations in the sample to all observations in the sample. The line Y = A+Bx is then used to approximate for any x, where A and B are read from the table. These are the A and B mentioned by Tobin in his section on obtaining trial values. (Author)

AD-606 955 Div. 15
OTS Prices: HC $2.00/MF $0.50

Carnegie Inst. of Tech., Pittsburgh, Pa.
Graduate School of Industrial Administration.
A HYBRID-DUAL INTEGER PROGRAMMING ALGORITHM,
by Fred Glover. Jul 64, 26p ONR-RM-128
Contract Nonr760 24, Proj. NR047 048

Unclassified report

Descriptors: (*Linear programming, Matrix algebra), Optimization, Theorems, Tables, Operations research.

The hybrid-dual algorithm is divided into two stages. In the first stage a linear program is solved to yield an optimal solution in fractional-valued variables. The final tableau given by the dual linear programming method is then transformed and expanded into a new tableau of a readily specifiable canonical form. In the second stage of the algorithm a variant of the bound escalation method is applied to the new tableau--and to the tableaus successively derived thereafter--until one or more of a distinguished set of columns (and a corresponding set of rows) attains a predetermined configuration. At this point the indicated rows and columns are discarded, never to be recovered, and the method continues recursively with the bound escalation algorithm until the problem is solved.

AD-606 965 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ABOUT PROJECTION PROPERTIES OF THE ORTHOCENTRIC TETRAHEDRON,
by Z. Riyves. 7 Apr 64, 14p
FTD MT63 310; TT 64 71515

Unclassified report

Edited machine trans. of Akademiya Nauk Estonskoi SSR, Tallinn. Izvestiya. Seriya Fiziko-Matematicheskikh i Tekhnicheskikh Nauk, 1960, v. 9, no. 1, p. 69-74. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Projective geometry, Geometric forms), Geometry, USSR.

AD-606 970 Div. 15, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
IMPROVING THE RELIABILITY OF ESTIMATES OBTAINED FROM A CONSENSUS OF EXPERTS,
by Bernice Brown and Olaf Helmer. Sep 64, 14p
P-2986

Unclassified report

Descriptors: (*Decision-making, Reliability), (*Operations research, Decision-making), Statistical analysis, Public opinion, Feedback.

The outcome of an experiment in the use of expert opinions is reported. The experiment involved both the so-called Delphi technique, which seeks to induce opinion convergence through a sequence of questionnaires interspersed with controlled opinion feedback, and the computation of a consensus based on self-appraised competence ratings.

AD-606 987 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE COMPUTATIONAL SOLUTION OF A CLASS OF FUNCTIONAL DIFFERENTIAL EQUATIONS,
by Richard Bellman and K. L. Cooke. Oct 64, 16p
RM-4287-PR
Contract AF49 638 700

Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Differential equations, Numerical methods and procedures), Equations, Difference equations, Iterative methods, Functions, Numerical analysis.

Functional differential equations of the form (1) $u'(t) = g(t,u(t), u(h(t)))$, and, more generally, of the form (2) $u'(t) = g(t,u(t), u(h(u,t)))$, arise in the construction of realistic models in a number of fields, ranging from electromagnetic theory and control theory to respiratory theory and neurophysiology. The analytic aspects are quite complex, and numerical solution is anything but routine, even with the aid of a digital computer. In this paper, a method for the computational treatment of differential-difference equations was extended to cover equations of the form given in (1). Equations of the type appearing in (2) can then be treated by means of successive approximations. (Author)

AD-607 002 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN EQUIVALENT LINEAR PROGRAMMING PROBLEM,
by George B. Dantzig and Selmer M. Johnson.
1 Aug 58, 8p P-1448

Unclassified report

Descriptors: (*Linear programming, Theorems), Mathematical logic, Mathematical programming, Matrix algebra, Optimization, Combinatorial analysis.

An equivalent formulation for a standard linear programming problem was developed. For the case where the number of variables is twice the number of equations m, the equivalent problem has the same size but has the inverses of the first and second m columns of the matrix of coefficients. (Author)

AD-607 009 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOLVING TWO-MOVE GAMES WITH PERFECT INFORMATION,
by George B. Dantzig. 11Aug 58, 7p P-1459

Unclassified report

Descriptors: (*Game theory, Linear programming), (*Linear programming, Game theory), Functions, Optimization, Matrix algebra, Operations research.

A two-move game with perfect information was considered, such as a move and counter-move situation between two firms or economies. This led to the problem of finding a global minimum of a concave function over a convex domain and the distressing possibility of local minima at

INCREASING THE CAPACITY OF A NETWORK: THE PARAMETRIC BUDGET PROBLEM,
by D. R. Fulkerson. 12 Jun 58, 26p P-1401
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Linear programming, Budgets), (*Budgets, Linear programming), Optimization, Calculus of variations Mathematical programming, Operations research.

The problem considered in this paper is that of allocating a budget of resources among the links of a network for the purpose of increasing its flow capacity relative to given sources and sinks. On the assumption that the cost of increasing each link capacity is linear, a labeling algorithm is described that permits rapid calculation of optimal allocations for all budgets.

AD-606 936 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE RANK OF A CERTAIN SET OF EQUATIONS,
by David Gale. 13 Jun 58, 10p P-1404
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Equations, Combinatorial analysis), (*Mapping (Transformations), Integral equations), Game theory, Matrix algebra, Functions, Algebra.

There is a certain well-known set of 6n2 linear equations in n4 unknowns whose nonnegative integral solutions are in one-to-one correspondence with pairs of orthogonal n-th order Latin squares. It is shown that the rank of this system is 6n2 - 8n + 3. (Author)

AD-606 938 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE k-TH BEST POLICIES,
by Richard Bellman and Robert Kalaba.
3 Jul 58, rev. 26 Feb 60, 16p P-1417
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Decision theory, Equations), (*Dynamic programming, Decision theory), Stochastic processes, Functions, Combinatorial analysis, Control systems, Feedback, Statistical analysis, Optimization.

It is shown how the functional equation technique of dynamic programming can be used to determine the optimal, second best, third best, etc., policies for various deterministic and stochastic multistage decision processes. This is of importance in various problems in combinatorial analysis, network and switching theory, feedback control, and sensitivity analysis. A routing problem is discussed in some detail. (Author)

AD-606 940 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
BOUNDS OF THE EXPECTATION OF A CONVEX FUNCTION OF A MULTIVARIATE RANDOM VARIABLE,
by Albert Madansky. 30 Jul 58, 14p P-1418
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Functions, Stochastic processes), (*Statistical distributions, Convex sets), Statistical functions, Inequalities, Distribution theory, Statistical analysis, Mathematical prediction.

Upper and lower bounds on the expectation of a convex function of a vector valued random variable are derived by examining the boundary of an appropriate multivariate moment space.

AD-606 942 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SEMI-GROUPS OF CLASS (C SUB O) IN L SUB P DETERMINED BY PARABOLIC DIFFERENTIAL EQUATIONS,
by Thomas W. Mullikin. 9 Jul 58, rev. 9 Jan 59,
28p P-1422
Unclassified report

Prepared in cooperation with Harvard Univ., Cambridge, Mass. under Contract N5ori07634.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Groups (Mathematics), Boundary value problems), (*Partial differential equations, Boundary value problems), Functions, Real numbers, Complex numbers, Matrix algebra, Functional analysis, Differential equations.

An application is made of the semi-group theory of E. Hille and R. S. Phillips to mixed initial-boundary value problems for non-singular parabolic differential equations in two variables.

AD-606 944 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON A LIOUVILLE TRANSFORMATION FOR u SUB xx + u SUB yy ± a(2) (x,y)u = 0,
by Richard Bellman. 22 Jul 58, 10p P-1440
Unclassified report

Descriptors: (*Transformations (Mathematics), Partial differential equations), (*Partial differential equations, Transformations (Mathematics)), Stability, Functions, Differential equations, Numerical analysis.

AD-606 946 Div. 15, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A TABLE FOR OBTAINING TRIAL VALUES FOR ESTIMATING RELATIONSHIPS IN WHICH THE DEPENDENT VARIABLE IS LIMITED,
by Richard N. Rosett. 24 Jul 58, 4p P-1444
Unclassified report

Descriptors: (*Tables, Factor analysis), (*Factor analysis, Tables), Statistical functions, Statistical analysis, Equations, Sampling, Numerical analysis, Economics.

In estimating relationships such as that described by J. Tobin in Econometrica (January 1958) it is necessary to approximate linearly the function. This table is based on the assumption that within the relevant (for a particular problem) range of this function, the number of times the function will be approximated is normally distributed around

The paper concerns the devising of a sequential scheme which minimizes the expected number of tests required to classify all of the N units as good or bad.

AD-607 064 Div. 15, 32
OTS Prices: HC $3.00/MF $0.75

Stanford Univ., Calif.
THE EVALUATION OF RISKY INTERRELATED INVESTMENTS.
Technical rept. no. 73,
by Frederick S. Hillier. 24 Jul 64, 97p
Contract Nonr225 53, Proj. NR042 002
Unclassified report

Descriptors: (*Mathematical programming, Optimization), (*Game theory, Economics), Numerical analysis, Probability, Money, Linear programming, Mathematical models.

A study was made of the problem of evaluating a set of risky interrelated investments. Choosing present value and expected utility of present value as criteria, exact and approximate procedures were developed for selecting the optimal combination of investments under various sets of assumptions. Necessary conditions for optimality were derived and a model for describing a proposed set of investments was developed. This model would be used for determining the mean, variance, and possibly the functional form of the probability distribution of present value. The question of when this distribution would be normal or approximately normal was extensively explored. Several models were developed for finding expected utility. Given these results, the problem can be solved by selecting the combination of investments which maximizes expected utility from among the feasible combinations for which the necessary conditions for optimality hold. The problem was also studied in a broader dynamic context. This study led to the formulation of a chance-constrained mathematical programming model. (Author)

AD-607 092 Div. 15
OTS Prices: HC $3.00/MF $0.75

Iowa State Univ., Iowa City.
DATA ACQUISITION AND REDUCTION. PHASE VII. PREDICTION OF RESULTS OF AN EVENT FROM SAMPLE DATA ANALYSIS.
Rept. no. 12,
by Royce Beckett and James Hurt. 7 Aug 64, 58p
Contract DA11 070 508ORD1232, Projs. 517 01 002, Q808
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Sampling, Experimental data), (*Statistical analysis, Experimental data), Mathematical prediction, Statistical processes, Numerical methods and procedures.

This report investigates various methods for reducing experimental records from a sample of similar events. The objective of the investigation is to find a method for predicting the outcome or result of this event in future trials. Statistical methods are used to find the probability that results from the event will fall within a given range of values. The various procedures that are studied are illustrated with a sample of seven data traces obtained at the Materials Testing Laboratory of the State University of Iowa. (Author)

AD-607 097 Div. 15
OTS Prices: HC $2.00/MF $0.50

Purdue Univ., Lafayette, Ind.
ON SOME MULTIPLE DECISION (SELECTION AND RANKING) RULES.
Mimeograph series no. 21,
by Shanti S. Gupta. Aug 64, 35p
Contract AF33 657 11737, Nonr1100 26
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Statistical analysis, Distribution theory), (*Distribution theory, Sampling), Set theory, Population (Mathematics), Statistical data, Tables.

This paper deals with some multiple decison (ranking and selection) problems. Some relevant distribution theory is given and the associated confidence bounds are derived for the differences (ratios) between the parameters. The selection procedures select a non-empty, small, best subset such that the probability is at least equal to a specified value P that the best population is selected in the subset. General results are given both for the unknown location and scale parameters of the k populations. Some desirable properties of these procedures are studied and proved. Selection of a subset to contain all populations better than a standard is also discussed. Performance characteristics of some procedures for the normal means problem are studied and tables are given for the probabilities of selecting the ith ranked population and for the expected proportion and the expected average rank in the selected subset. A brief review of work by other authors in the problems of selection and ranking and in other related problems is given. (Author)

AD-607 098 Div. 15
OTS Prices: HC $1.00/MF $0.50

Purdue Univ., Lafayette, Ind.
ON THE DISTRIBUTION OF THE LARGEST CHARACTERISTIC ROOT OF A MATRIX IN MULTIVARIATE ANALYSIS.
Mimeograph series no 22,
by K. C. Sreedharan Pillai. Sep 64, 20p
Contract Nonr1100 26
Unclassified report

Descriptors: (*Statistical analysis, Matrix algebra), (*Statistical functions, Matrix algebra), Distribution theory, Algebra, Integrals, Numerical analysis, Errors, Complex numbers, Polynomials.

AD-607 099 Div. 15
OTS Prices: HC $1.00/MF $0.50

Purdue Univ., Lafayette, Ind.
ON ELEMENTARY SYMMETRIC FUNCTIONS OF THE ROOTS OF TWO MATRICES IN MULTIVARIATE ANALYSIS.
Mimeograph series no. 23,
by K. C. Sreedharan Pillai. Sep 64, 16p
Contract Nonr1100 26
Unclassified report

Descriptors: (*Statistical analysis, Matrix algebra), (*Statistical functions, Matrix algebra), Distribution theory, Complex numbers, Polynomials, Algebra, Integrals, Numerical analysis.

A lemma was proved to show that the moments of the (s-i)th elementary symmetric function (esf) in s non-null characteristic roots, lambda sub i (i = 1, 2, ..., s), of a

every extreme point. It was shown however that the global minimum could be obtained by solving a linear programming system with side conditions that at least one of certain pairs of variables vanish. The latter problem can be shown to be equivalent to solving a linear programming problem with some integer valued variables. (Author)

AD-607 016 Div. 15
OTS Prices: HC $4.00/MF $1.00

RAND Corp., Santa Monica, Calif.
ASYMPTOTIC BEHAVIOR OF SOLUTIONS OF DIFFERENTIAL-DIFFERENCE EQUATIONS,
by Richard Bellman and Kenneth L. Cooke.
28 Aug 58, 126p P-1470
Unclassified report

Descriptors: (*Difference equations, Differential equations), (*Series, Difference equations), Transformations (Mathematics), Integral equations, Numerical analysis.

In this paper, the problem was considered of determining the asymptotic behavior of solutions of linear differential-difference equations whose coefficients possess asymptotic series. Although the problem is considerably more complicated than the corresponding problem for ordinary differential equations, by means of a sequence of transformations the problem was reduced to a form where the standard techniques of ordinary differential equation theory could be employed. The differential-difference equation was transformed into an integral equation which was transformed into an integro-differential equation. At this point the Liouville transformation plays a vital role. Although the guiding ideas were simple, the analysis became formidable. For this reason, only some of the more immediate aspects of the problem were considered.

AD-607 024 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE SIGNIFICANCE OF SOLVING LINEAR PROGRAMMING PROBLEMS WITH SOME INTEGER VARIABLES,
by George B. Dantzig. 8 Sep 58, rev. 9 Apr 59,
29p P-1486
Unclassified report

Descriptors: (*Linear programming, Numerical methods and procedures), Mathematical programming, Combinatorial analysis, Real variables, Functions, Mathematical logic, Calculus of variations.

Recent proposals by Gomory and others for solving linear programs involving integer-valued variables appear sufficiently promising that it is worthwhile to systematically review and classify problems that can be reduced to this class and thereby solved. Historically, non-linear, non-convex and combinatorial problems are areas where classical mathematics almost always fails. It is therefore significant that the reduction can be made for problems involving multiple dichotomies and k-fold alternatives which include problems with discrete variables, non-linear separable minimizing functions, conditional constraints, global minimum of general concave functions and combinatorial problems such as the fixed charge problem, traveling salesman problem, orthogonal latin square problems, and map coloring problems. (Author)

AD-607 025 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE CROSS-SECTION METHOD, AN ALGORITHM FOR LINEAR PROGRAMMING,
by Jeremy J. Stone. 16 Sep 58, 24p P-1490
Unclassified report

Descriptors: (*Linear programming, Numerical methods and procedures), (*Numerical methods and procedures, Linear programming), Matrix algebra, Operations research.

In this paper an algorithm is presented which solves the linear programming problem. This algorithm combines the usual phase one (getting feasibility) and phase two (getting optimality) of the Simplex or Dual methods into a single phase. The algorithm begins with either a single activity (column) or a constraint (equation) and proceeds to add either activities or constraints one at a time, solving the subproblems which arise for their optimal solutions. The final solution is attained after adding the last activity or constraint. The algorithm promises to be an efficient one and has several advantages which arise from the information supplied about subproblems. (Author)

AD-607 026 Div. 15
OTS Prices: HC $4.00/MF $1.00

RAND Corp., Santa Monica, Calif.
PROSPECTUS FOR A REORIENTATION OF GAME THEORY,
by T. C. Schelling. 17 Sep 58, 126p P-1491
Unclassified report

Descriptors: (*Game theory, Feasibility studies), Mathematical logic, Matrix algebra, Effectiveness, Mathematics, Metamathematics.

AD-607 027 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FUNCTIONAL EQUATIONS AND MAXIMUM RANGE,
by Richard Bellman. 24 Sep 58, 8p P-1494
Unclassified report

Descriptors: (*Equations, Dynamic programming), (*Trajectories, Optimization), (*Dynamic programming, Trajectories), Functions, Motion, Ranges (Distance), Position finding, Height finding, Velocity.

The current interest in rockets and space travel has aroused a corresponding interest in the determination of maximum range, minimum time, and so on, for various types of trajectories. A variety of questions of this type have been treated by means of the theory of dynamic programming. Here it is shown how to use functional equations to determine the range, the maximum elevation, and similar quantities, as functions of initial position and velocities. (Author)

AD-607 063 Div. 15
OTS Prices: HC $3.00/MF $0.75

Stanford Univ., Calif.
OPTIMAL GROUP TESTING.
Technical rept. no. 72,
by Milton Sobel. 10 Jul 64, 69p
Contract Nonr225 53, Proj. NR042 002
Unclassified report

Descriptors: (*Statistical tests, Sequential analysis), Groups (Mathematics), Probability, Optimization, Set theory.

based on geometrical interpretation is proposed. The novelty in our formulation lies in the fact that the solution is expressed as a product-of-sums expression which has factors with both uncomplemented and complemented variables. The presence of these factors with complemented variables can be profitably utilized to yield an efficient branching procedure for reducing the redundancy. (Author)

AD-607 230 Div. 15
OTS Prices: HC $1.00/MF $0.50

Digital Systems Lab., Princeton Univ., N. J.
A REDUCTION TECHNIQUE FOR PRIME IMPLICANT TABLES.
Technical rept.,
by James F. Gimpel. Aug 64, 11p PU-DSL-40
Unclassified report

See also AD-607 227.

Descriptors: (*Numerical methods and procedures, Matrix algebra), (*Matrix algebra, Special functions (Mathematical)), (*Special functions (Mathematical), Matrix algebra), (*Prime numbers, Tables), Algebra, Algebras, Mathematical programming.

Solving prime implicant tables is greatly facilitated by reduction techniques such as row dominance, column dominance and essential row selection. This paper presents a new reduction technique which is operable on any otherwise irreducible table having a column covered by two rows. (Author)

AD-607 233 Div. 15
OTS Prices: HC $4.00/MF $1.00

Stanford Univ., Calif.
GENERALIZED CONVEXITY CONES.
Technical rept. no. 39,
by Zvi Ziegler. 4 May 64, 128p
Contract Nonr225 28, Proj. NR047 019
Unclassified report

Descriptors: (*Convex sets, Theory), Conical bodies, Functions, Algebra, Inequalities, Differential equations, Integration, Polynomials, Numerical analysis.

Contents:
Introduction
The dual cone of C (psi sub 1,..., psi sub n)
Extreme rays
The cone dual to an intersection of generalized convexity cones
Generalized difference quotients and multivariate convexity
Miscellaneous applications of generalized convexity.

AD-607 254 Div. 15
OTS Prices: HC $3.00/MF $0.75

Cruft Lab., Harvard Univ., Cambridge, Mass.
GENERATING FUNCTIONS OF ABSTRACT GRAPHS WITH APPLICATIONS,
by C. V. Ramamoorthy and D. W. Tufts. 24 Mar 64, 64p Cruft-TR-439
Contract Nonr1866 16, Proj. NR372 012
Unclassified report

Descriptors: (*Graphics, Algebraic topology), (*Algebraic topology, Graphics), (*Matrix algebra, Graphics), (*Functions, Graphics), Networks, Theory, Numerical methods and procedures, Statistical analysis.

This report is concerned with the concept, properties, and application of generating functions of abstract graphs. Many practical problems can be handled in a unified manner using these techniques, for example: code, generation, path enumeration, shift register sequences, sampled data systems, discrete Markov processes, and certain connectivity considerations in automata. The generating function of a graph is a function of the complex variable z which has the property that interesting attributes of the graph can be extracted from it by numerical operations. The generating function can be written as a standard rational function of z, and the denominator is called the characteristic function of the graph. This latter function, interesting in its own right, can also be obtained independently. The computation of the generating function involves either matrix inversions or application of formulas that take into account the topological characteristics of the graph. (Author)

AD-607 259 Div. 15
OTS Prices: HC $2.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
ASYMPTOTIC DIFFERENTIAL-DELAY EQUATIONS,
by Leon Kotin. Sep 64, 32p
Task 1C014501B14A00
USAEL TR2498
Unclassified report

Descriptors: (*Differential equations, Difference equations), Theorems, Series, Inequalities, Polynomials, Time lag theory, Real time, Control systems, Theory, Transformations (Mathematics).

Differential-delay equations have achieved a certain importance with recent developments in technology. The theory of control systems, to name just one of many applications, depends to a large degree on such equations. This report was devoted to the general first-order linear homogeneous differential-delay equation and some generalizations to non-linear and higher order equations. In particular, the oscillatory behavior and bounds of solutions of such equations are discussed. (Author)

AD-607 267 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A CONFIDENCE INTERVAL COMPARISON OF TWO TEST PROCEDURES PROPOSED FOR THE BEHRENS-FISHER PROBLEM,
by S. James Press. Oct 64, 25p P-2999
Grant NSF GP214
Unclassified report

Descriptors: (*Statistical tests, Analysis), (*Series, Numerical analysis), Statistical distributions, Statistical analysis, Special functions (Mathematical), Transformations (Mathematics), Stochastic processes, Mathematical prediction.

The procedures of Scheffe and Welch were compared according to the expected lengths of the confidence intervals they yield, and a criterion was developed for deciding which of the two methods is better in any given situation. An expression for the expected length of the confidence interval for the Scheffe procedure was developed by Scheffe. Because of the asymptotic series nature of the Welch procedure, in this case, the analogous expression is more involved. It was developed in detail. Graphs were provided to summarize the numerical results. Finally, it was shown that in large samples, the two procedures are equivalent. (Author)

AD-607 275 Div. 15
OTS Prices: HC $2.00/MF $0.50

Geneva Univ. (Switzerland).
COMBINATORIAL PROBLEMS IN DESIGN OF EXPERIMENTS.

matrix in multivariate analysis could be derived from those of the ith esf. Using this lemma the first four moments of the (s-1)th esf were obtained from those of the first esf already known (Pillai, 1954, 1960; Pillai and Samson, 1959). Further, a second lemma was given showing that the moments of the (s-1)th esf in the s characteristic roots, theta sub i = lambda sub i/(1 + lambda sub i), are derivable from those of the first esf in the lambda's. Upper percentage points (5% and 1%) were obtained for the distribution of the (s-1)th esf in the lambda's for s = 3 using the moment quotients. An example was given to illustrate the use of this criterion. (Author)

AD-607 100 Div. 15, 23, 28
OTS Prices: HC $1.00/MF $0.50

Purdue Univ., Lafayette, Ind.
OPTIMAL SELECTION BASED ON RELATIVE RANK (THE 'SECRETARY PROBLEM').
Mimeograph Series no. 28,
by Y. S. Chow, S. Moriguri, H. Robbins, and S. M. Samuels. Sep 64, 18p
Contracts Nonr1100 26, Nonr266 59, Proj. 042 205
Unclassified report

For another version of this report see AD-606 485.

Descriptors: (*Decision theory, Game theory), (*Game theory, Decision theory), (*Dynamic programming, Optimization), Probability, Decision making, Permutations, Inequalities, Stochastic processes, Selection, Personnel.

AD-607 101 Div. 15
OTS Prices: HC $1.00/MF $0.50

Purdue Univ., Lafayette, Ind.
ON THE ASYMPTOTIC THEORY OF FIXED-WIDTH SEQUENTIAL CONFIDENCE INTERVALS FOR THE MEAN.
Mimeograph series no. 30,
by Y. S. Chow and Herbert Robbins. Oct 64, 16p
Contracts Nonr1100 26, Nonr266 59, Proj. 042 205
Unclassified report

Prepared in cooperation with Columbia Univ., New York.

Descriptors: (*Statistical analysis, Theory), Sequences, Probability, Stochastic processes, Measure theory, Population (Mathematics).

AD-607 114 Div. 15, 7, 30
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
QUALITATIVE ANALYSIS OF ONE SYSTEM OF DIFFERENTIAL EQUATIONS PERTAINING TO CONTROL THEORY,
by N. N. Serebryakova. 30 Sep 64, 28p
FTD TT64 417; TT 64 71522
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, 1963, no. 5, p. 29-41.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Differential equations, Transformations (Mathematics)), (*Control, Theory), (*Electric motors, Stabilization systems), Equations, Motion, Rotation, Control systems, Clocks, Direct current, Integral transforms, USSR.

A system for stabilizing the rate of rotation of the shaft of a d-c electric motor using a clock regulator with an oscillating balance-spiral system and a contact equalizing device was considered. Piecewise linear differential equations describing this system were investigated by the method of point transformation and all possible regimes of its operation were found. (Author)

AD-607 135 Div. 15
OTS Prices: HC $2.00/MF $0.50

Radiation, Inc., Melbourne, Fla.
ON SOME DOUBLE ORTHOGONALITY PROPERTIES OF THE SPHEROIDAL AND MATHIEU FUNCTIONS.
Scientific rept. no. 2,
by Donald R. Rhodes. 15 Sep 64, 31p
Contract AF19 628 4007, Proj. 4600, Task 460007
AFCRL 64 641
Unclassified report

Descriptors: (*Special functions (Mathematical), Theory), Set theory, Integral equations, Polynomials, Differential equations, Functions.

The spheroidal and Mathieu functions were shown to form complete orthogonal sets over two separate intervals simultaneously. The normalization factors over each of these two intervals, (-1,1) and (- infinity, infinity), were derived. (Author)

AD-607 191 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
LINEAR COMBINATIONS OF NON-CENTRAL CHI-SQUARED VARIATES,
by Sheldon James Press. Sep 64, 16p P-2983
Unclassified report

Descriptors: (*Analysis of variance, Theorems), Statistical distributions, Statistical functions, Probability, Sequences, Special functions (Mathematical).

AD-607 227 Div. 15
OTS Prices: HC $1.00/MF $0.50

Digital Systems Lab., Princeton Univ., N. J.
ON DETERMINATION OF THE IRREDUNDANT COVERS OF A PRIME IMPLICANT TABLE.
Technical rept.,
by Amerendra Mukhopadhyay. Jul 64, 19p
PU-DSL-36
Unclassified report

Descriptors: (*Numerical methods and procedures, Matrix algebra), (*Matrix algebra, Special functions (Mathematical)), (*Special functions (Mathematical), Matrix algebra), (*Prime numbers, Tables), Algebra, Algebras, Mathematical programming.

An algorithm for generating the irredundant covers of a prime implicant table is discussed in this paper. The method depends on a representation of the prime implicant table on a 'prime implicant lattice' defined in terms of a partial ordering which takes its motivation from the equation x + xy = x. The problem is formulated in terms of certain properties on the lattice and a solution primarily

AD-607 370 Div. 15, 25
OTS Prices: HC $3.00/MF $0.75

North Carolina State Coll., Raleigh. School of Physical Sciences and Applied Mathematics.
APPROXIMATE METHODS FOR THE SOLUTION OF CERTAIN DUAL FOURIER-BESSEL SERIES RELATIONS,
by Jerry A. Roberts. 20 Jul 64, 93p PSR-24/1
Grant AF AFOSR444 64

Unclassified report

Descriptors: (*Series, Numerical methods and procedures), (*Numerical methods and procedures, Series), Fourier analysis, Integral equations, Bessel functions, Stresses, Fracture (Mechanics),

The dual Fourier-Bessel series relation was considered, where the sequence (Phi sub n) was to be determined. Dual series relations of this type occur in the investigation of stresses in a long elastic cylinder which contains a concentric penny-shaped crack. Numerical solutions for certain cases of this problem were obtained by use of the Cooke-Tranter solution, and by the Sneddon-Srivastav solution. Several methods for obtaining approximate solutions were developed. The errors incurred in using these approximations were discussed, and means of improving the original approximations were considered.

AD-607 402 Div. 15
OTS Prices: HC $1.00/MF $0.50

Uppsala Univ. (Sweden).
SEPARATION OF EIGENVALUES FOR TRIDIAGONAL MATRICES.
Scientific rept. no. 21,
by J. O. Nordling. 1 Jul 64, 20p
Contract AF61 052 701
ARL 64 212

Unclassified report

Descriptors: (*Matrix algebra, Transformations (Mathematics)), Separation, Theorems, Algebra, Numerical methods and procedures.

An extensive generalization of the separation theorem is obtained for tridiagonal matrices and some simple applications are discussed. A complete scheme for eigenvalue calculation is given and it is also modified to the case of 'almost tridiagonal matrices'. (Author)

AD-607 403 Div. 15
OTS Prices: HC $2.25/MF $0.75

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
MORE TABLES OF THE INCOMPLETE GAMMA-FUNCTION RATIO AND OF PERCENTAGE POINTS OF THE CHI-SQUARE DISTRIBUTION,
by H. Leon Harter. Aug 64, 99p
Proj. 7071, Task 7071 01
ARL 64 123

Unclassified report

Descriptors: (*Special functions (Mathematical), Tables), (*Statistical distributions, Tables), Statistical tests, Numerical methods and procedures, Integrals, Probability, Distribution theory.

The following tables, together with brief discussions of methods of computation and uses, are included: (1) a nine-decimal-place table of the incomplete Gamma-function ratio, I(u,p), for p= -0.95(0.05)4 and u at intervals of 0.1; and (2) a six-significant-figure table of the percentage points, corresponding to cumulative probabilities P= .0001, .0005, .001, .005, .01, .025, .05, .1(.1) .9, .95, .975, .99, .995, .999,. 9995, and .9999, of the chi-square distribution with v = 0.1(0.1) 10 degrees of freedom. Both tables are accurate to within a unit in the last place. (Author)

Final technical rept.,
by I. M. Chakravarti. Jun 64, 30p
Contract AF61 052 648, Proj. 7071, Task 7071 01
ARL 64 102

Unclassified report

See also AD-437 236.

Descriptors: (*Combinatorial analysis, Numerical methods and procedures), (*Numerical methods and procedures, Combinatorial analysis), Permutations, Matrix algebra, Mapping (Transformations).

This report is in two parts. In Part A, a relationship is established between orthogonal mappings and difference sets for construction of orthogonal arrays. Permutation matrices are introduced to construct equimodular matrices with elements from the group of pth roots of unity. These matrices provide the difference sets. In part B, a brief review of important results is given. Some results in orthogonal arrays, which depend on the uniqueness of existence of association schemes, have been derived. (Author)

AD-607 348 Div. 15
OTS Prices: HC $2.00/MF $0.50

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
THE ANOMALOUS CONCEPT OF STATISTICAL EVIDENCE: AXIOMS, INTERPRETATIONS, AND ELEMENTARY EXPOSITION,
by Allan Birnbaum. Oct 64, 49p IMM-NYU-332
Contract Nonr285 38

Unclassified report

Invited paper presented at the Joint European Conference of Statistical Societies, Berne, Switzerland, September 14, 1964.

Descriptors: (*Statistical analysis, Theory), (*Stochastic processes, Mathematical models), Probability, Statistical functions, Statistical processes, Decision theory.

This paper presented some new mathematical and interpretive material on concepts of statistical evidence. The material was given a self-contained elementary expository form (restricted to the case of discrete probability distributions) suitable for early inclusion in any mathematical statistics course however elementary. Part I (Sections 1-6) in particular is a brief but rounded elementary account of 'the concept of statistical evidence and the anomalous problem of its interpretation.' Part II presents further axioms for evidence and derivations of their interrelations in elementary form; its Sections 7-9 present concepts which have figured significantly in the development of statistical thinking, and are a basis for a reading of Part III. The latter contains general discussion intended to given even serious beginning students, among others, some suggestions for perspectives on the broad field of statistical theories and the historical pattern of their development. The axioms of statistical evidence and some related concepts discussed, with their mathematical interrelations, are summarized. The conceptual issues and historical patterns discussed are indicated schematically. (Author)

AD-607 349 Div. 15
OTS Prices: HC $2.00/MF $0.50

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
SOME ABSOLUTELY CONTINUOUS OPERATORS I,
by P. A. Rejto. Sep 64, 39p IMM-NYU-329
Contract Nonr285 46

Unclassified report

Descriptors: (*Operators (Mathematics), Functional analysis), (*Functional analysis, Operators (Mathematics)), Perturbation theory, Matrix algebra, Functions, Integrals.

In this report abstract conditions were formulated which assure that the part of an operator over a given interval is absolutely continuous. These conditions were verified for the operators - d sq./dx sq. + q (x) acting on the intervals (-infinity, + infinity) and (0, + infinity) respectively, provided that the function q dies out at infinity. (Author)

AD-607 350 Div. 15
OTS Prices: HC $2.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
ESTIMATION OF THE TRANSITION DISTRIBUTIONS OF A MARKOV RENEWAL PROCESS,
by Erin H. Moore and Ronald Pyke. Sep 64, 30p
DI-82-0371; Boeing-Math-364

Unclassified report

Prepared in cooperation with Washington Univ., Seattle. Also available from the authors.

Descriptors: (*Statistical distributions, Statistical processes), (*Statistical processes, Statistical distributions), Distribution theory, Probability, Perturbation theory.

The present paper is concerned with the estimation of the transition distributions of a Markov renewal process with finitely many states, which extends and unifies some aspects of the results in the special cases of discrete and continuous parameter Markov chains. A natural estimator of the transition distributions is defined and shown to be consistent. Limiting distributions of this estimator are derived. A density for a Markov renewal process is developed to permit the definition of maximum likelihood estimators for a renewal process and for a Markov renewal process. (Author)

AD-607 351 Div. 15
OTS Prices: HC $1.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
HARMONIC FUNCTIONS AND HITTING DISTRIBUTIONS FOR MARKOV PROCESSES,
by G. B. Crawford. Sep 64, 12p D1-82-0375; Boeing-Math-367

Unclassified report

Also available from the author.

Descriptors: (*Statistical processes, Potential theory), Functions, Polynomials, Complex numbers, Real numbers, Algebra, Harmonic analysis.

It is shown that for a Markov process satisfying Hunt's condition A the class of harmonic functions completely determines the family of hitting distributions. Also, the author shows that for certain processes in two dimensions these hitting distributions are completely determined by two suitably chosen independent harmonic functions. This result parallels and extends the well known one dimensional result that hitting distributions are completely determined by one harmonic function. (Author)

Descriptors: (*Electromagnetism, Biophysics), (*Nervous system, Electromagnetism), (*Behavior, Electromagnetism), Cerebral cortex, Neuromuscular transmission, Sensory mechanisms, Electromagnetic waves, Frequency, Absorption spectrum, Tissues (Biology), Heat tolerance, Electroencephalography, Physiology, Thalamus, Cholinesterase, Conditioned response, Reviews.

Electromagnetic energy is an important factor in the biophysical analysis of the properties of living systems. This energy is being used as a research tool, both by study of the emission of living organisms and also by applying it to the organism. Certain portions of the spectrum are only now receiving study in terms of their interaction with organisms. A portion of this work is of importance to those interested in the nervous system and behavior. For example, data suggest that fingertip vision may be an em phenomenon. It has been suggested that em energy is involved in information transfer and storage. Neural and behavioral changes have been elicited at low power densities with UHF frequency em energy. Most of this work is being done in the Soviet Union and is relatively unknown in the U.S. This paper is an analytical review, primarily of foreign data, with emphasis upon those relevant to the nervous system and behavior. Papers are reviewed in six groups. These deal, respectively, with sensory effects, conditioning, activity, cortical, subcortical, and morphological effects. The implications of the data are discussed and several lines of investigation are suggested. (Author)

AD-606 986 Div. 16, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DETAILS OF THE PROGRAM FOR A MATHEMATICAL MODEL OF DRUG DISTRIBUTION ASSUMING MIXING IN THE LARGE BLOOD VESSELS,
by Stanley Azen. Oct 64, 37p RM-4211-NIH
Grant PHS GM09608 03

Unclassified report

Descriptors: (*Chemotherapy, Mathematical models), Blood vessels, Drugs, Reaction kinetics, Pharmacology, Blood circulation, Laminar flow, Cells (Biology), Tissues (Biology), Permeability, Differential equations, Time-lag theory.

This memorandum reports on an aspect of a continuing program of research on a mathematical model of chemotherapy. It presents the formatted equations for a two-organ model in which there is exchange between the stationary and flowing phases in the large blood vessels. A computer program has been written, the results of which appear in the report. (Author)

AD-607 044 Div. 16, 12
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Lab., (6570th), Wright-Patterson AFB, Ohio.
MAN'S VERTICAL ACCELERATION WHILE CROUCHING,
by Donald D. Mueller. Aug 64, 13p Proj. 7184, Task 718405
AMRL TDR64 56

Unclassified report

Descriptors: (*Acceleration, Posture), (*Astronauts, Posture), Weightlessness, Body weight, Center of mass, Feet, Legs.

The vertical accelerations involved in crouching and returning to the erect position were computed from the measured forces applied by the subject's feet to a force plate. The subjects were simply instructed to squat, retrieve an object from the floor and return to the erect position in a normal manner. The average peak accelerations were found to range from 0.118 to 0.166 G. If an astronaut's acceleration pattern is the same under weightlessness, a restraint system or device capable of holding with a force equal to at least one third the astronaut's earth weight will be required to prevent his feet from leaving the floor when crouching and to prevent launching himself away from the floor when arising from a crouched position. (Author)

AD-607 050 Div. 16
OTS Prices: HC $1.00/MF $0.50

Illinois Univ., Chicago. Coll. of Medicine.
TERMINATION PROGRESS REPORT. RELATIONSHIP OF CHEMISTRY TO NERVE CONDUCTION AND EXCITATION,
by Leo G. Abood. 23 Sep 64, 8p
Contract Nonr1459 03, Proj. NR101 128

Unclassified report

Descriptors: (*Nerve impulses, Chemistry), Adenosine phosphates, Nerve cells, Nervous system, Mitochondria, Brain, Enzymes, Radioactive isotopes, Labeled substances, Ions, Membranes (Biology), Phosphorous, Anatomical models.

The fundamental objective of this research program was to investigate the relationship of chemistry to nerve conduction and excitation. Among the more important questions that have been considered are the following: (1) What is the function of ATP and the related compounds in the maintenance of bioelectric activity. (2) Since the excitatory membrane of the neuron is the primary functional unit of the cell, what are some of the unique biochemical and physico-chemical characteristics responsible for its activity. (3) Once techniques have been developed to isolate various cytoplasmic organelles (mitochondria, myelin, synaptic nerve endings, and axonal fragments), what can be learned concerning the function and significance of these structures in the nervous system. (4) What kind of a simplified model constructed of biological material, can be utilized in the understanding of bioelectric phenomena.

AD-607 052 Div. 16, 12
OTS Prices: HC $4.00/MF $0.75

Virginia Univ., Charlottesville.
A SURVEY OF CHRONIC WEIGHTLESSNESS SIMULATION IN BIOLOGICAL RESEARCH,
by Charles C. Wunder. 1964 122p
Contract AF18 600 2057

Unclassified report

Prepared in cooperation with Iowa State Univ., Iowa City, the National Institutes of Health, and the American Cancer Society.

Descriptors: (*Weightlessness), Simulation), (*Space biology, Weightlessness), Acceleration, Gravity, Relaxation (Physiology), Buoyancy, Flotation, Tumbling, Bone, Joints (Physiology), Muscles, Tolerances (Physiology), Nervous system, Plants (Botany), Growth, Animals, Humans, Space medicine.

The central emphasis of the survey concerns the status of research involving various methods of effecting chronic weightlessness for organisms. Three general types of approach are considered: (1) accelerations that oppose the Earth's gravity, (2) indirect reduction of gravitational effects, and (3) indirect information from increases of

16. Medical Sciences

AD-606 878 Div. 16, 3
OTS Prices: HC $6.00/MF $1.25

Lever Brothers Co., Edgewater, N. J.
BASIC STUDIES IN PERCUTANEOUS ABSORPTION.
Semi-annual rept. no. 7, Jan-Jun 64,
by S. Epstein, W. R. Koehler, T. Masurat, E. J. Singer, and J. L. Solan. Jun 64, 250p
Contract DA18 108CML6573

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. Initial distribution copies contain color which will be shown in black-and-white when it is necessary to reprint. See also AD-434 459.

Descriptors: (*Skin, Absorption), (*Organic solvents, Penetration), (*Lipids, Permeability), Integumentary system, Water, Nickel, Tritiated compounds, Diffusion, Fatty acids, Atmospheric temperature, Histology, Membranes (Biology), pH, Solvent extraction, Enzymes, Tissues (Biology), Models (Simulations), Oils, Ointments, Tracer studies, Water vapor.

Studies were continued along several lines regarding the nature and properties of the skin barrier. A better understanding of the relationships between temperature and relative humidity and degree of hydration of skin was gained. Also reported are the effects of organic solvents which can be divided into two classes; one having a superficial effect of removing surface lipids and the other having a profound action of irreparably disrupting the barrier even without the physical removal of lipids. The activity of various lipids in enhancing the skin barrier was investigated employing, in addition to the measurements of water diffusion rate, assays of the skin resistance to a primary irritant and of the penetration of nickel and tritiated water. Arachidonic acid was shown to be vital in restoring the skin barrier in EFA-deficient rats. (Author)

AD-606 882 Div. 16
OTS Prices: HC $1.00/MF $0.50

Arctic Health Research Center, Anchorage, Alaska.
A METHOD OF DETERMINING THE POLLUTION OF SURFACE WATERS BY THE EGGS OF ECHINOCOCCUS,
by D. J. Baumgartner. Jul 64, 16p
Proj. 8246, Task 8246 1
AAL TDR63 37

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Water pollution, Platyhelminths), (*Test methods, Water pollution), Eggs, Larvae, Sedimentation, Chlorination, Water supplies, Diseases, Infections, Dogs, Alaska, Air force personnel, Safety.

A continuous upward flow sedimentation unit was developed to test surface waters at remote U. S. Air Force radar stations in Alaska for the presence of eggs of Echinococcus. Chlorination employed at these water supplies is not an effective protection. Many animals in these areas are infected with the tapeworm, and man can serve as a host for the larval form. Diagnoses of echinococcosis in the native population caused concern by the Air Force for health of Air Force personnel. Lack of early disease symptoms and unreliability of clinical tests necessitate physical surveillance of water supplies. Laboratory tests validated methodology. One field test showed negative results. Further tests are recommended. (Author)

AD-606 952 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
EFFECT OF HIGH MAGNETIC FIELDS ON RESPIRATION AND PHOTOSYNTHESIS IN ALGAE.
Interim rept.,
by P. J. Hannan. 15 Sep 64, 14p
Proj. RR007 08 44 5503
NRL 6153

Unclassified report

Descriptors: (*Algae, Photosynthesis), (*Magnetic fields, Respiration), (*Photosynthesis, Magnetic fields), (*Respiration, Algae), Culture Media, Oxygen, Carbon dioxide, Closed ecological systems, Submarines.

An algal culture apparatus was designed to fit inside the 2-1/2-in. bore of a large electromagnet capable of providing fields exceeding 100,000 gauss. Photosynthesis and respiration rates of Chlorella pyrenoidosa (7-11-05) were determined by analyzing the input and effluent gases for oxygen. Two experiments were conducted: (a) the effect of 10,000 gauss on photosynthesis, and (b) the effect of 100,000 gauss on respiration. In neither case did the magnetic field have any effect. (Author)

AD-606 953 Div. 16
OTS Prices: HC $7.00/MF $1.75

New York State Coll. of Agriculture, Cornell Univ., Ithaca.
EFFECTIVENESS OF SELECTION BASED ON VARIABILITY UNCOMPLICATED BY HETEROTIC EFFECTS IN NEUROSPORA,
Technical rept. no. 18,
by Kenneth Edwin Papa. Sep 64, 332p
Contract Nonr401 39, Proj. NR042 212

Unclassified report

Doctoral thesis.

Descriptors: (*Neurospora, Reproduction (Physiology)), (*Genetics, Mathematical models), Life cycle, Growth, Selection, Molds (Organisms), Temperature, Mathematical analysis, Culture media, Plants (Botany), Mutations, Fertility, Equations, Correlation techniques.

Selection for fast growth rate was practiced at 3 different temperatures in inter- and intra-strain crosses of Neurospora. The selection procedure was specifically designed to test genetic models in relation to genetic progress. Estimates of the parameters involved in the theoretical response curves were obtained from the experimental data. An estimate of the genetic component of variance based only the early generations of selection was chosen over one which weighted each generation equally. Since environmental variances increased with temperature, data over temperatures were not pooled. Logarithmic and square root transformations of the data failed to stabilize the environmental variances among the temperatures or among the crosses within any one temperature. An investigation of the estimators involved in the predicted response curve indicated that estimates of the slope and intercept were least squares estimators conditional on the fact that genetic and environmental estimates were the true values. Relatively good agreement was obtained between observed and theoretical responses to selection at the 3 different temperatures.

AD-606 961 Div. 16, 28
OTS Prices: HC $2.00/MF $0.50

Institute for Research, State Coll., Pa.
BEHAVIORAL BIOPHYSICS,
by Allan H. Frey. Apr 64, 36p IR-64-01
Contracts Nonr3303 00 and Nonr4169 00

Unclassified report

Chemical interactions are known to be important for the transmission of impulses across the synapse; the importance of these interactions in connection with brain mechanisms is discussed. The physiology of the neurohumoral agent, serotonin, is discussed; it has a role in brain function, but its exact function remains obscure. Methods of evaluating the amount of a particular binding component and its equilibrium constant are discussed; these involve the measurement of the amount bound as a function of serotonin concentration. Binding components are distinguished by the association constant of the binding reaction. Functional significance is assigned to the binding components by investigation of their properties, and particularly, by examination of the effects of inhibitors on the binding component. The amount bound by a homogenate is determined by equilibrium dialysis, centrifugal separation of the macromolecule phase, and a method involving the macromolecular exclusion properties of sephadex. Nerve ending particles containing elements of the synapse have been isolated by a combination of differential and isopycknic centrifugation. (Author)

AD-607 239 Div. 16
OTS Prices: HC $2.00/MF $0.50

Lankenau Hospital Research Inst., Philadelphia, Pa.
CARDIODYNAMIC AND METABOLIC EFFECTS OF PROLONGED BED REST WITH DAILY RECUMBENT OR SITTING EXERCISE AND WITH SITTING INACTIVITY.
Technical rept. for May-Nov 63,
by N. C. Birkhead, J. J. Blizzard, J. W. Daly, G. J. Haupt, and B. Issekutz, Jr. Aug 64, 55p
Contract AF33 657 9049, Proj. 7164, Task 716405
AMRL TDR64 61

Unclassified report

Descriptors: (*Cardiovascular system, Relaxation (Physiology)), (*Metabolism, Relaxation (Physiology)), (*Exercise, Physical fitness), (*Astronauts, Physical fitness), Diet, Blood chemistry, Nitrogen, Calcium, Phosphorus, Oxygen, Urine, Posture, Heart, Body weight, Medical examination, Space medicine, Stress (Physiology), Tolerances (Physiology).

Eight healthy mean were studied to evaluate the modifying effects of supine or sitting exercise or quiet sitting on the circulatory and metabolic consequences of prolonged bed rest. Four subjects remained at recumbent bed rest for 24 days except for 1 hour daily lying (2 subjects) or sitting (2 subjects) bicycle ergometer exercise, and four subjects remained at recumbent bed rest for 16 hours and sat quietly in a chair for 8 hours daily for 30 days. All subjects underwent physical training for 18 days before and after these periods of inactivity. Just before and after the period of inactivity, the response to 70 degree head-up body tilt and maximal O2 uptake were determined. One hour daily of lying or sitting exercise prevented the deterioration of physical work capacity previously found during six weeks of bed rest alone. Supine exercise did not prevent the development of tilt intolerance but sitting exercise was effective in one of two subjects. Eight hours daily of quiet sitting added to bed rest resulted in only minor decreases in physical work capacity and maintained tilt tolerance in three of four subjects. Supine or sitting exercise or quiet sitting did not prevent the increased urinary calcium excretion. There was no consistent change in nitrogen balance. (Author)

AD-607 307 Div. 16, 12
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SPACE BIOLOGY: A NEW SCIENCE,
by N. Hurduc. 1 Oct 64, 21p
FTD TT64 664; TT 64 71561

Unclassified report

Edited trans. of Natura: Seria Biologie (Rumania) 1963, v. 15, no. 2, p. 3-12.

Descriptors: (*Space biology, Scientific research), Space flight, Astronauts, Space medicine, Acceleration, Weightlessness, Vibration, Cosmic rays, Closed ecological systems, Life support, Algae, Space environmental conditions, Mars.

The primary task of space biology is the study of three large groups of problems: (1) The influence of liminal (extreme) conditions, which are characteristic of space flight, on living terrestrial organisms; (2) The study and realization of the biological foundations that will assure space flights and the possibility of living on other planets; and (3) The study of conditions and forms of life outside the Earth.

AD-607 374 Div. 16, 28
OTS Prices: HC $1.00/MF $0.50

Instituto de Neurologia, Montevideo (Uruguay).
ATTENTION, HABITUATION AND CONDITIONING AS RELATED TO THE BRAIN WAVES.
Final technical rept. for 1 May 60-30 Apr 64,
by Elio Garcia-Austt, Jaime Bogacz, Adela Vanzulli, and Pablo Handler. May 64, 16p
Grant AF AFOSR312 63
AFOSR 64 1841

Unclassified report

Descriptors: (*Sensory mechanisms, Electroencephalography), (*Electroencephalography, Sensory mechanisms), (*Learning, Electroencephalography), Brain, Auditory signals, Visual signals, Nervous system, Physiology, Sensory perception, Reflexes, Attention, Sleep, Stimulation, Eye, Ear, Cerebral cortex, Guinea pigs.

The primary aim of the research program was to obtain an objective appreciation of the time pattern of attention, habituation and other forms of learning in man. The second aim was to study the mechanism of this sensory control. Two possibilities, which do not exclude each other, were suggested: (1) a direct inhibitory action upon the specific pathways from the receptor up to the cerebral cortex, and (2) an indirect centrifugal action through the muscular mechanism regulating the energy of the stimulus. It was proposed to determine the role of the pupillary and ocular muscles in visual evoked response changes.

AD-607 388 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval Applied Science Lab., Brooklyn, N. Y.
BURNS TO SKIN BY MILLISECOND LIGHT PULSES.
Progress rept. no. 1,
by Willard L. Derksen, John Bracciaventi, and George Mixter, Jr. 6 Jul 64, 36p
NASL 9400 12; DASA 1532

Unclassified report

Descriptors: (*Burns, Thermal radiation), (*Thermal radiation, Burns), (*Nuclear explosions, Burns), Simulation, Rats, Medical research, Test methods, Flash lamps.

The radiant energy required to produce skin burns for thermal radiation exposures with durations less than 100

gravitational load. After initiation of this survey, the Air Force requested particular consideration of immobilization as one type of approach to the problems of weightlessness simulation. Immobilization (by means of casts, splints, tenotomy, and denervation) is considered as one aspect of the second category listed above. Other aspects of that category are bed rest, support by frictionless devices, buoyant support (during water immersion), and tumbling.

AD-607 055 Div. 16, 4, 25
OTS Prices: HC $1.00/MF $0.50

Biophysics Lab., Stanford Univ., Calif.
INTERNATIONAL SUMMER SCHOOL OF MOLECULAR BIOPHYSICS.
Final rept. for Jan-Dec 64,
by M. Weissbluth. Oct 64, 9p BL-122
Grant Nonr G00052 64, Proj. NR314 104

Unclassified report

Descriptors: (*Biophysics, Symposia), Biology, Biochemistry, Physics, Molecules.

The program and a summary of activities of the ISSMB, held at Squaw Valley, Calif., 17-28 August 1964, is given.

AD-607 120 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MATERIALS ON THE TOXICOLOGY OF RADIOACTIVE SUBSTANCES,
by V. F. Zhuravlev and I. K. Petrovich. 21 Sep 64, 12p
FTD TT64 599; TT 64 71532

Unclassified report

Unedited rough draft rans. of Meditsinskaya Radiologiya (USSR) 1963, v. 8, no. 12, p. 81-83.

Descriptors: (*Toxicity, Radioactive isotopes), (*Radioactive isotopes, Toxicity), Radiobiology, Iron, Iron compounds, Oxides, Hemopoietic system, Metabolism, Carbohydrates, Central nervous system, Cardiovascular system, Neoplasms, Morphology (Biology), Tissues (Biology), Toxic tolerances, Radiation effects, Electrocardiography, Blood chemistry, Industrial medicine.

This third collection of works on the toxicology of radioactive substances has theoretical and practical value for radiobiology. The presentation of this collection gives, to a wide circle of radiobiologists, interesting data on the effect of radioactive iron (Fe59) on the hemopoiesis system, on the variation of the carbohydrate metabolism, the cardio-vascular system, and the biological currents of the brain, and on the morphological displacements during acute and chronic effects. Interest in this isotope, on the part of toxicologists, hematologists, and radiobiologists, is connected with its wide use in industry and medicine.

AD-607 121 Div. 16
OTS Prices: HC $3.00/MF $0.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE DYNAMICS OF BLOOD CIRCULATION PARAMETERS OF THE CEREBRAL VASCULAR SYSTEM DURING LONGITUDINAL GRAVITATIONAL LOADS; EMOTIONAL STRESS OF COSMONAUTS DURING SPACE FLIGHTS; A SYMPOSIUM ON APPLIED MICROBIOLOGY (IN STOCKHOLM),
by Yu. E. Moskalenko, O. G. Gazenko, V. I. Yazdovskii, G. V. Altukhov, and E. N. Mishustin. 1 Oct 64, 67p
FTD TT64 534; TT 64 71531

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Seriya Biologicheskaya, 1964, v. 29, no. 2, p. 280-297, 306-311, 325-331.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Blood circulation, Gravity), (*Cerebral cortex, Blood circulation), (*Stress (Psychology), Astronauts), (*Microbiology, Symposia), (*Agriculture, Microbiology), Pulse rate, Respiration, Central nervous system, Thresholds (Physiology), Emotions, Acceleration, Weightlessness, Food, Immunology, Microorganisms, Antibiotics, Enzymes, Biological warfare, Insects, USSR.

AD-607 144 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
APPLIANCE FOR DERIVATION OF ELECTROENCEPHALOGRAM DURING PROLONGED ROTATION OF HUMAN SUBJECTS,
by A. A. Marinichev. 6 Oct 64, 9p
FTD TT64 877; TT 64 71537

Unclassified report

Unedited rough draft trans. of Fiziologicheskii Zhurnal SSSR, 1964, v. 50, no. 3, p. 381-383.

Descriptors: (*Electroencephalography, Rotation), (*Rotation, Electroencephalography), (*Laboratory equipment, Electroencephalography), Design, Test methods.

The study of EEG is of considerable interest during different types of effects on the vestibular system of man or animal. However, the derivation of a man's EEG during his rotation comprises known difficulties since the derivated potentials are very small, and the noise developing in the contact system is large. To solve this experimental problem various circuits and materials were tested. In the end, a transition device with sliding, self-cleaning contacts proved to be most reliable and practicable.

AD-607 167 Div. 16
OTS Prices: HC $6.00/MF $1.25

Cornell Univ., Ithaca, N. Y.
SEROTONIN BINDING TO PREPARATIONS FROM RAT BRAIN,
Technical rept., no. 6,
by R. M. Marchbanks. 1 Aug 64, 225p
Contract Nonr401 40, Grant NSF GP971

Unclassified report

Rept. on Cognitive Systems Research Program. Doctoral thesis.

Descriptors: (*Serotonin, Reaction kinetics), (*Nerve cells, Serotonin), (*Brain, Serotonin), Nerve impulses, Enzymes, Oxidoreductases, Nervous system, Lysergic acids, Reserpine, Inhibition, Chlorpromazine, Acetylcholine, Fatty acids, Levarterenol, Learning, Memory, Permeability, Membranes (Biology), Mitochondria, Morphology (Biology), Central nervous system, Drug, Chemical bonds, Equations, Biochemistry, Physiology.

The binding of serotonin to elements from the synapse has been investigated in an attempt to develop methods for the investigation of synaptic events by biochemical methods.

17. Metallurgy

AD-606 884 Div. 17
OTS Prices: HC $2.00/MF $0.50

Army Materials Research Agency, Watertown, Mass.
QUANTITATIVE PHASE ANALYSIS IN TEXTURED MATERIALS.
by Stanley L. Lopata and Eric B. Kula. Aug 64, 26p
Proj. 1A024401A11002
AMRA TR64 21

Unclassified report

Descriptors: (*Austenite, Crystal structure), (*Iron alloys, Metallic crystals), Nickel alloys, Rods, Sheets, X-ray diffraction analysis, Phase studies, Quantitative analysis.

The problem of preferred orientation was considered in quantitative phase analysis by X-ray diffraction techniques. The average intensity of a diffraction peak can be obtained by integration over the whole pole figure, or by random rotation of the specimen in the X-ray beam, or by a combination of both. For rod or wire, where the pole figure shows rotational symmetry, the intensity is measured along a radius of the pole figure. Where no symmetry is present, rotational symmetry is imparted by rapid rotation of the sheet around its surface normal during measurement. These methods are applied to the determination of austenite in an Fe-31 percent nickel rod and Fe-28 percent nickel sheet. (Author)

AD-607 001 Div. 17, 25
OTS Prices: HC $3.00/MF $0.75

Bureau of Engineering Research, Rutgers Univ., New Brunswick, N. J.
DUCTILE-BRITTLE TRANSITION IN REFRACTORY METALS.
Rept. for 1 Mar 63-31 May 64,
by T. Ellis and S. Weissmann. Jul 64, 58p
Contract AF33 657 10872, Proj. 7351, Task 735101
ML TDR64 220

Unclassified report

Descriptors: (*Refractory metals, Metallography), (*Metallography, Refractory metals), (*Transition temperature, Tungsten), (*Tungsten, Transition temperature), Tungsten, Ductility, Brittleness, Stresses, Strain (Mechanics), Cryogenics, Mathematical analysis, X-ray photography, Crystal structure, Crystal lattice defects, Single crystals, Deformation.

This report is presented in two sections; the first of these deals with the precision analysis of the divergent beam technique which forms the basis of a stress-strain analysis. The second section deals with the application of the divergent beam method to the ductile-brittle transition in tungsten. In the first section an X-ray method is described which permits a precise determination of the interplanar spacings in a crystal. The method is capable of disclosing small differences in interplanar spacings even between various sets of (hkl) planes of the same form and, therefore, serves as a basis for a stress-strain analysis. The results of the stress-strain analysis at 298K and 77K presented in the second section of this report show a close correlation between the maximum shearing strains obtained experimentally and the resolved shear stress factor. The build-up of shearing strains is attributed to dislocation multiplication and interaction on active slip planes. It is shown that the absolute strain values obtained are too large and it is also shown that this is due not to inaccuracy of measurements but to inadequacy of sampling of orientations. This sampling is now being improved by tilting the specimen surface relative to the probing X-ray beam. (Author)

AD-607 048 Div. 17
OTS Prices: HC $7.00/MF $1.75

Crucible Steel Co. of America, Pittsburgh, Pa.
FRACTURE MICROMECHANICS IN HIGH-STRENGTH STEELS AND TITANIUM.
Rept. for 15 Dec 62-15 May 64,
by B. R. Banerjee and J. J. Hauser. 31 Jul 64, 336p
Contract AF33 657 10337, continuation of Contract AF33 616 8156, Proj. 7351, Task 735105
ML TDR64 182

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Steel, Fracture (Mechanics)), (*Titanium alloys, Fracture (Mechanics)), (*Fracture (Mechanics), Alloys), Stainless steel, Martensite, Maraging steels, Chromium alloys, Nickel alloys, Molybdenum alloys, Cobalt alloys, Mechanical properties, Heat treatment, Microstructure, Aging (Materials), Structural properties, Vanadium alloys, Tensile properties.

To characterize the structural factors that govern the heterogeneous micromechanics of flow and facture in high-strength materials, a variety of high-strength steels and a high-strength titanium alloy were investigated in detail. Among the alloys studied were AISI 4340, a low-alloy high-strength steel; Type H-11, a secondary-hardening hot-work steel; Types 410 and 422, martensitic stainless steels; Type 301, a deformation-strengthened steel; Type PH15-7Mo, a precipitation hardened semiaustenitic steel; 300 grade 18 Ni marage steel; Cr-Co stainless marage AFC-77; and B-120VCA, an age-hardened beta titanium alloy. In these materials, the detailed fine structures are characterized and related to strength and fracture properties. Thus, a better understanding of the interrlation between strength and structural factors was achieved. (Author)

AD-607 077 Div. 17, 2, 30
OTS Prices: HC $8.15/MF $2.25

Hughes Tool Co., Houston, Tex.
SCIENTIFIC AND TECHNICAL APPLICATIONS FORECAST, 1964, EXCAVATION.
Final rept.
26 Dec 63, 514p
Contract DA49 092ARO30

Unclassified report

Descriptors: (*Mining engineering, Scientific research), (*Scientific research, Earth-handling equipment), Drilling machines, Structural geology, Drills, Nuclear explosions, Melting, Abstracting, Bibliographies, Rock (Geology), Underground structures.

This study deals primarily with underground excavation in rock. Conventional tunnel driving techniques, that is by drilling blasting with explosives and loading, can produce 50 to 75 feet advance per day. There is little likelihood that this daily advance rate by these means will exceed a maximum of 100 feet per day in 20 years. At the normal industrial research and engineering development pace mechanical tunnel drivers will be able to penetrate from 100 to 200 feet per day in twenty years. An accelerated research program would reduce the time to reach this 20 year forecast to ten years and would provide a capability of 150 to 250 feet per day in 20 years. Research will involve a thorough study of rock mechanics to establish unique means of causing controlled massive failure of rock as well as research in mechanisms and techniques to accomplish these desired results. Nuclear devices do not show much promise for making usable underground cavities although they will undoubtedly be used to mine massive ore bodies with planned roof failures. On the other hand nuclear devices will be used for large scale surface excavations such as may be required for canal or harbor excavations.

milliseconds has never been measured. To determine values for durations in the order of milliseconds, burns were produced on the depilated skin of albino rats by exposure to the irradiance from a xenon flash lamp energized with 14,000 joules. The intensity of the radiant pulse peaked in 0.4 millisecond and decayed to one-half the peak value in 5 millisecond. The threshold burn - a lesion exhibiting a scab - occurred in one-half of the exposures at a distance from the lamp at which the radiant exposure was 3.5 cal/sq cm. Minor lesions of short duration occurred at 2 cal/sq cm. In general the scabs appeared thinner than those which develop as a result of exposures of longer duration. To study the effect of pigmentation and to provide data which would be more amenable to mathematical analysis, another experiment was run with the skin made opaque with a thin black film. For the opaque situation the temperature profile history can be determined with greater certainty, since the energy is absorbed only at the surface and not in depth in the skin as in the case of the uncovered situation. For the blackened skin, a radiant exposure of only 0.35 cal/sq cm produced scab lesions in one-half of the exposures and minor burns occurred at 0.2 cal/sq cm. The course of the burn recovery was studied pictorially. (Author)

AD-607 274 Div. 17, 21
OTS Prices: HC $3.00/MF $0.50

Air Research Mfg. Co., Phoenix, Ariz.
MATERIALS INVESTIGATION, SNAP 50/SPUR PROGRAM. PART I. CREEP RUPTURE PROPERTIES OF STRESS-RELIEVED TZM ALLOY.
Rept. for Jun 63-Apr 64,
by R. L. Salley and E. A. Kovacevich. Oct 64, 55p
APS-5092-R
Contract AF33 657 10922
APL TDR64 116 P1

Unclassified report

Descriptors: (*Molybdenum alloys, Creep), (*Creep, Molybdenum), Materials, Titanium alloys, Carbon alloys, Zirconium alloys, Potassium, Vapors, Rupture, Transport properties, Corrosion, Environment tests, Microstructure, Stresses, Heat treatment, Crystals, Turbine wheels, Turbine blades, Nuclear propulsion.

The results of experimental investigations to determine the effect of potassium on the creep-rupture properties of the TZM alloy are presented herein. The tests were conducted at 1800 and 2000F, with and without exposure to saturated potassium vapor. The results indicated that the creep-rupture behavior was not influenced significantly by exposure to potassium vapor for periods of approximately 1,000 hours. However, some mass-transfer type corrosion was observed. This signifies that it is dangerous to extrapolate the results of this study to 10,000 hours, because progressive mass transfer might eventually cause accelerated creep and premature failure. (Author)

AD-607 314 Div. 17
OTS Prices: HC $3.00/MF $0.50

Auburn Univ., Ala. Research Foundation.
INVESTIGATION OF MECHANISM OF FAILURE OF HIGH-STRENGTH MATERIALS. PART II. THE EFFECT OF THICKNESS AND TEMPERING TEMPERATURE ON FRACTURE APPEARANCE TRANSITION TEMPERATURE AND CRITICAL FRACTURE TOUGHNESS OF HIGH STRENGTH SHEET STEEL.
Technical rept. no. 2 (final),
by Hal W. Maynor, Jr., and Ralph E. Blair. 30 May 63, 56p
Contract DA01 009ORD889

Unclassified report

See also AD-273 672.

Descriptors: (*Steel, Fracture (Mechanics)), (*Fracture (Mechanics), Steel), Transition temperature, Toughness, Sheets, Temperature, Thickness, Heat treatment, Materials, Tensile properties, Shear stresses, Molybdenum alloys, Chromium alloys, Vanadium alloys, Nickel alloys, Manganese alloys.

The critical fracture toughness parameter, K sub c, of AMS-6434 sheet steel reflected a degree of independence of specimen thickness at yield strengths, sigma sub YS, of 191.5 and 236 ksi, when considered in terms of any particular test temperature within the range -300 to 300F. The K sub c parameter generally followed the trend established by increasing proportion of shear fracture, regardless of the existence of individual or collective effects of sheet thickness, tempering temperature or test temperature. Fracture appearance transition temperature, FATT, was observed to decrease non-linearly with decreasing specimen thickness for sigma sub YS = 191.5 and 236 ksi. The effect of decreasing thickness was relatively more pronounced in depressing FATT than was the effect of increasing tempering temperature. (Author)

AD-607 315 Div. 17
OTS Prices: HC $2.00/MF $0.50

Auburn Univ., Ala. Research Foundation.
INVESTIGATION OF MECHANISM OF FAILURE OF HIGH-STRENGTH MATERIALS. PART III. A COMPARISON OF FRACTURE TOUGHNESS OF HIGH-STRENGTH SHEET STEEL AS DETERMINED BY COMPLIANCE-GAGE AND FRACTURE-APPEARANCE METHODS.
Technical rept. no. 2 (final),
by Hal W. Maynor, Jr., and Ralph E. Blair. 30 May 63, 36p
Contract DA19 01 009ORD889

Unclassified report

See also AF-607 314.

Descriptors: (*Steel, Fracture (Mechanics)), (*Fracture (Mechanics), Steel), Sheets, Toughness, Test methods, Meters, Chromium alloys, Molybdenum alloys, Vanadium alloys, Manganese alloys, Tensile properties, Thickness, Shear stresses.

A compliance gage of modified design was conceived and constructed. Using the modified gage, an experimental curve relating compliance and crack extension factor was obtained. The rather excellent agreement between the experimental curve and the Irwin-Westergaard theoretical curve was the basis for considering the modified gage to be reliable. A comparison of K sub Ic and K sub c3 values revealed that the former were of lower magnitude, consistently, than the latter for the yield strength level of 157 ksi. The reason for this behavior, apparently contradictory to the observations of others, was not established. The dependence of K sub c3 on thickness, although not of primary interest in this investigation, was observed to reflect a changing trend with varying strength level. The slopes of K sub c3 versus thickness curves changed from positive, to essentially zero, to negative as the yield strength increased from 157, to 214, to 235 ksi, respectively. (Author)

AD-607 404 Div. 17
OTS Prices: HC $1.25/MF $0.75

Army Materials Research Agency, Watertown, Mass.
THE INFLUENCE OF ALLOYING ELEMENTS ON THE Ti-6Al-6V-2Sn ALLOY,
by Arthur Ayvazian, Robert Colton, and Perry Smoot.
Aug 64, 58p
Proj. 1A024401A110
AMRA TR64 15

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Titanium alloys, Mechanical properties), Aluminum alloys, Silicon alloys, Vanadium alloys, Chromium alloys, Molybdenum alloys, Manganese alloys, Nickel alloys, Uranium alloys, Tensile properties, Zirconium alloys, Deformation, Ductility, Microstructure, Heat treatment.

An investigation was conducted on eight promising, high-strength titanium alloys which had as their basic composition Ti-6Al-6V-2Sn. Small percentages of beta-stabilizing elements, such as Cr, Mo, Mn, Ni and U, in various combinations along with a maximum of 4 percent Zr were added. Selection of these alloys was based upon results of a previous U. S. Army Materials Research Agency program. The series of studies consisted of (1) determining the beta transus temperature, (2) determining proper forging temperature, and (3) establishing a thermal cycle, which would result in optimum mechanical properties. The results of standard tensile and V-notch Charpy impact test bars machined from upset billets which were forged and heat

AD-607 126 Div. 17
OTS Prices: HC $6.00/MF $1.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INFLUENCE OF ALLOYING ELEMENTS ON THE PROPERTIES OF STEEL,
by M. P. Braun. 24 Aug 64, 202p
FTD MT63 271; TT 64 71526

Unclassified report

Edited machine trans. of mono. Vliyanie Letiruyushchikh Elementov na Svoistva Stali, Kiev, 1962, 192p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Steel, Alloys), Metallurgy, Mechanical properties, Brittleness, Fracture (Mechanics), Carbides, Heat treatment, Grain structures (Metallurgy), Austenite, Transformations, Tensile properties, Plasticity, Toughness, Castings, Silicon alloys, Manganese alloys, Carbon alloys, Material formings, USSR.

Investigations were made to determine the effect of alloying elements on the tendency of machine steel to brittle fracture, grain growth in thermal treatment, and austenite transformations; isothermal and thermokinetic diagrams of alloy steels are given. Considerable attention has been given to the study of the mechanical and technological properties steels in connection with their alloying and inoculation. Given are data on the strength, plasticity, and toughness of low-alloy and large-scale alloy steels in products with large cross sections as well as recommendations as to a rational use of steels in order to economize nickel, molybdenum, and other scarce metals. This book is intended for scientific and engineering-technical workers such as metal scientists and heat scientists. (Author)

AD-607 214 Div. 17, 4, 10
OTS Prices: HC $1.00/MF $0.50

Texaco Experiment, Inc., Richmond, Va.
NON-EQUILIBRIUM COMBUSTION.
Quarterly progress rept. for 15 Jun-14 Sep 64.
12 Oct 64, 14p EXP-401, EXP-TM-1588
Contract N600 19 58555

Unclassified report

Descriptors: (*Aluminum, Oxidation), Foils, Liquid metals, Corrosion, Reaction kinetics, Manometers, Volumetric analysis, Surface properties, Combusion.

A combination manometric and volumetric system was constructed for determining the oxidation rates of both solid and molten aluminum. Preliminary experiments indicate that the sensitivity and accuracy of the system are adequate for the present study. A number of runs were made using aluminum foil at 600C. Although the actual oxidation rates were not reproducible, the total amount of oxygen consumed was approximately the same in all cases. The inconsistency in the results confirm previous findings, i.e. oxidation rates depend greatly on the way the surface is originally treated. This is apparently true even in the case of molten aluminum. Aluminum foil, at 600C, gained approximately 5.2 micro-gm/sq. cm. Initial experiments with molten aluminum indicate much higher weight gains than those obtained with aluminum foil. (Author)

AD-607 236 Div. 17, 25
OTS Prices: HC $0.75/MF $0.50

Materials Research Corp., Orangeburg, N. Y.
THE RECRYSTALLIZATION KINETICS OF HIGH PURITY IRON.
Final technical rept. for 1 Oct 62-1 Oct 63,
by E. J. Hughes, P. W. Barton, A. A. Johnson, and G. Abowitz. Aug 64, 33p
Contract AF33 657 9852, Proj. 7021, Task 7021 01
ARL 64 131

Unclassified report

Descriptors: (*Recrystallization, Iron), (*Iron, Recrystallization), Zone melting, Purification, Electron beams, Refining (Metallurgy), Grain boundaries, Impurities, Phase studies, Tungsten, Carbon, Nitrogen, Oxygen, Hydrogen.

Measurements have been made of the isothermal recrystallization kinetics of electron beam zone refined iron. The principal impurities in this material were tungsten, carbon, nitrogen, oxygen and hydrogen which together totalled approximately 50 ppm. The results are interpreted in terms of a theory of solute limited grain boundary migration recently proposed by Cahn (1962). According to this interpretation the boundary velocity at low velocities is determined principally by drag due to the tungsten impurity atoms, while at high velocities it is determined principally by the other four species of impurities. Some evidence tending to support these conclusions was obtained by repeating the measurements on similar material to which extra carbon had been added. This had the effect, as expected, of slowing down the grain boundary migration more in the high velocity region than in the low. (Author)

AD-607 258 Div. 17
OTS Prices: HC $3.00/MF $0.75

Lockheed Missiles and Space Co., Sunnyvale, Calif.
RECOVERY BEHAVIOR OF PURE ALUMINUM AND SELECTED BODY-CENTERED CUBIC METALS.
Rept. for 1 Mar 63-30 Mar 64,
by J. L. Lytton, K. H. Westmacott, and L. C. Potter.
Aug 64, 64p
Contract AF33 657 10281, Proj. 7351, Task 735106
ML TDR64 189

Unclassified report

Descriptors: (*Aluminum, Shear stresses), (*Molybdenum, Shear stresses), (*Niobium, Shear stresses), Molybdenum alloys, Tungsten alloys, Stresses, Electron microscopy, Metallography, Crystal substructure, Crystal lattice defects, Deformation, Grain boundaries, High-temperature research.

The flow stress recovery of high-purity aluminum, unalloyed sintered molybdenum, Mo-1 wt % W, and electron-beam-melted columbium following a tensile prestrain was studied in terms of a fractional flow stress recovery parameter f. The flow stress recovery behavior was related to the dislocation rearrangements using transmission electron microscopy for aluminum and columbium and etch-pit techniques for molybdenum. During recovery of aluminum at 120C and 160C, nearly stable strength levels were attained, the strength level for 120C recovery being greater than that for 160C. This stabilization of flow stress was related to the formation of metastable dislocation networks bounding nearly perfect cells. The recovery of molybdenum and Mo-1 wt % W was studied at 800 and 900C, and the results showed that the tungsten addition had no effect on the recovery behavior. An etch-pit study of the dislocation substructures formed at 900C revealed that recovery was accompanied by the formation of subboundaries along certain lattice planes to form approximately square cells when viewed in the sheet plane. The recovery of columbium was studied at 800 and 900C. The flow stress decreased and then increased after reaching a minimum, especially at 900C. Network formation was shown to occur, and the observed increase of flow stress with increasing recovery time was related to the formation of a precipitate along dislocation lines.

18. Military Sciences and Operations

AD-606 902 Div. 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
USE OF A SIMULATION LABORATORY TO STUDY THE ORGANIZATION AND EFFECTIVENESS OF AIR FORCE LOGISTICS,
by Stephen Enke. 16 Apr 58, 10p P-1343
Unclassified report

Descriptors: (*Air force logistics command, Simulation), (*Logistics, Management engineering), Costs, Air force systems command, Armed forces supplies, Data processing systems, Spare parts, Aircraft, Performance (Human), Decision making, Game theory, Operations research.

The Logistics Systems Laboratory concluded its first large-scale simulation. Two sets of supply policies were compared, and the 'new' set was tested for operability, all within a simulated Air Force logistics system including bases, supply depots, a parts repair depot, a contractor's plant, an electronic data-processing center, various agencies within the Air Material Command, and certain other Command headquarters.

AD-606 916 Div. 18, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INTERSERVICE SUPPLY MANAGEMENT WITHIN THE DEFENSE DEPARTMENT,
by Stephen Enke. 8 May 58, 20p P-1366
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Logistics, Management planning), (*Management planning, Department of Defense), Management engineering, Armed forces supplies, Armed forces procurement, Management control systems, Stock level control.

Slowly but inexorably in fact as well as on paper, many of the supply activities of the four Services are being integrated within the Department of Defense. Although most of the still unintegrated logistics activities tend to be peculiar in some way to a particular Service, and so should never be centralized, there are still many supply items that are sufficiently common to justify more coordinated management. Some of these possibilities, and particularly a reconstitution and extension of the present Interservice Supply Support Committee, are examined in this article.

AD-606 922 Div. 18, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
USE OF MATHEMATICAL MODELS FOR LOGISTICAL PLANNING,
by Jack D. Little. 19 May 58, 18p P-1375
Unclassified report

Presented at the Management Seminar on Electronic Data Processing, Brookley AFB, Mobile, Ala., 14 Apr 58.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Logistics, Management planning), (*Management planning, Mathematical models), Weapon systems, Spare parts, Guided missiles, Programming (Computers), Storage, Decision making, Training.

The paper gives a definition of machine models and their uses in logistic planning and experimentation. As examples, a general description is given of a man-machine model, and of the Missile Support Model. This description covers such areas as:
(1) The purpose of these models.
(2) The general procedure used in creating the models.
(3) The trouble areas found in this creative period.
(4) The results obtained from the running of the models.
(5) The trouble areas found in the running of the models.
(6) Other possible uses of models, such as a means of training on a managerial level. (Author)

AD-606 939 Div. 18, 26
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A FIRST EXPERIMENT IN LOGISTICS SYSTEM SIMULATION,
by Murray A. Geisler. 8 Jul 58, rev. 1 Jul 59, 50p P-1415
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Logistics, Simulation), (*Management planning, Logistics), Weapon systems, Feasibility studies, Costs, Aircraft, Spare parts.

AD-607 006 Div. 18, 26, 28
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SIMULATION IN RAND'S LOGISTICS SYSTEMS LABORATORY, LABORATORY PROBLEM 1,
by W. W. Haythorn. 3 Sep 58, 9p P-1456
Unclassified report

Prepared for presentation at the American Psychological Association Convention, at the Hotel Statler, Washington, D. C., 28 Aug-3 Sep 58.

Descriptors: (*Management engineering, Logistics), (*Logistics, Management engineering), Simulation, Computers, Spare parts, Aircraft, Malfunctions, maintenance, Social communication, Weapon systems, Inventory.

AD-607 007 Div. 18, 26, 28
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMMUNICATIONS ANALYSIS IN LP-I (THE LOGISTIC SYSTEMS LABORATORY'S PROJECT-I),
by R. S. Beverly. 11 Aug 58, 30p P-1457
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
Prepared for presentation at the American Psychological Association Convention at Hotel Statler, Washington, D. C., 28 Aug-3 Sep 58.

Descriptors: (*Logistics, Management engineering), (*Social communication, Analysis), Communication systems, Simulation, Weapon systems, Military personnel, Behavior, Spare parts, Systems engineering, Job analysis, Aircraft, Computers.

treated at optimum investigated temperatures, indicated a general increase in the tensile and yield strength when compared with the base alloy, Ti-6Al-6V-2Sn. The overall improvements in strength ranged from a substantial increase of approximately 15,000 psi in both yield and tensile strengths at 0.1 percent offset for several of the alloys, to an increase of from 0 to 8,000 psi for the remainder of the alloys. (Author)

The initial calibration experiments performed at the Radiation Test Facility of the Protective Structures Development Center are described and their results analyzed. The dose rate above an open field and the attenuation afforded by the steel frame of the test structure is calculated and found to agree well with experiment when modified calculational procedures are used. The cumulative angular distribution of direct radiation is found to be as much as fourteen percent above that predicted by theory over the range investigated. Several modifications of presently used calculational techniques are suggested. (Author)

AD-607 134 Div. 18, 26
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
COST-EFFECTIVENESS ANALYSIS AS A MANAGEMENT TOOL,
by Chauncey F. Bell. Oct 64, 69p P-2988
Unclassified report

Prepared for presentation to the Defense Weapons Systems Management Center, Wright-Patterson Air Force Base, 22 Oct 64.

Descriptors: (*Costs, Management engineering), (*Management engineering, Decision making), (*Defense systems, Simulation), Guided missiles, Stock level control, Armed forces budgets, Computers, Logistics, Maintainability, Air force personnel, Weapon systems, Manpower studies, Effectiveness.

The potential value of cost-effectiveness analysis as a management tool is discussed. Such analyses can be useful because they suggest an examination of alternative ways of attaining a given objective or goal, because they focus attention on selecting appropriate objectives and relevant variables, and because they require identification and quantification of these factors. While such apparent precision may sometimes lead to unwarranted confidence in the results, any management decision is affected as much or more by such short-comings, independent of cost-effectiveness analysis. On balance, then, the identification, quantification, and systemization of cost-effectiveness analyses adds to the likelihood that the resulting judgment decision is a good one.

AD-607 158 Div. 18, 1
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
AERIAL COMBAT IN THE STRATOSPHERE AND A SMALL AIR-BATTLE LEXICON,
by W. Kopenhagen and Henkes. 22 Sep 64, 16p
FTD TT64 641; TT 64 71540
Unclassified report

Unedited rough draft trans. of Aero-Sport (East Germany) 1964, no. 3, p. 77-83.

Descriptors: (*Aerial warfare, Stratosphere), (*Stratosphere, Aerial warfare), Interception, Fighters, Aerial targets, Aircraft defense systems, Air control centers, Air traffic controllers, Dictionary, Radar interception.

This is the story of a day in the life of an East German air intercept controller. There is a description of an exercise intercept from alarm to intercept.

AD-607 187 Div. 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME IMPLICATIONS OF 'WEAPONS SYSTEM SUPPORT' BY AMC,
by Stephen Enke. 27 Jun 55, 12p RM-1508
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Weapon systems, Stock level control), (*Stock level control, Weapon systems), Strategic materials, Mobilization, Logistics, Supply depots, Spare parts, Maintenance, Data processing systems, Storage, Management engineering, Armed forces procurement.

'Weapons systems support' by AMC promises to supply mobile combat units more effectively and to reduce present depot concentrations of some property subclasses. However, there will be a tendency to increase stock holdings as a result, and this aspect should be costed if possible. It is important too that the repair and procurement of common items continue to be on a commodity basis, and that subsidiary 'weapon support' ownership accounts are not allowed to develop. (Author)

AD-607 190 Div. 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMBAT BETWEEN HETEROGENEOUS FORCES,
by O. Helmer. 5 May 47, 12p RM-6
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Warfare, Military strategy), (*Military strategy, Lanchester equations), Optimization, Differential equations, Matrix algebra.

AD-607 256 Div. 18, 15, 28, 30
OTS Prices: HC $1.75/MF $0.75

Laboratory of Aviation Psychology, Ohio State Univ. Research Foundation, Columbus.
AN APPLICATION OF BAYES THEOREM AS A HYPOTHESIS-SELECTION AID IN A COMPLEX INFORMATION-PROCESSING SYSTEM.
Final rept. for 15 Mar 63-31 Jan 64,
by Jack F. Southard, Davis A. Schum, and George E. Briggs. Aug 64, 73p
Contract AF33 657 10763, Proj. 7184, Task 718403
AMRL TDR64 51
Unclassified report

Descriptors: (*Threat evaluation, Data processing systems), (*Decision making, Threat evaluation), (*Statistical analysis, Military intelligence), Computers, Simulation, Probability, Mathematical prediction, Theorems, Officer personnel, Air defense command, Human engineering, Performance (Human), Real time, Applied psychology, Systems engineering, Simulation.

The first of a series of experiments investigating the value of automated hypothesis-evaluation aids in multiman-machine systems devoted to assessing or diagnosing threat is described. In the experiment, an eight-man team evaluated threats posed by a hypothetical aggressor. The team made these evaluations on the basis of intelligence information gathered during simulated reconnaissance overflights of aggressor's territory. The primary output of the threat-evaluation team was the commanding officer's posterior probabilities estimates as to aggressor's most likely hostile strategies. During half of the experimental trials, the commander had access to computer-produced posterior probabilities based upon a modification of the

AD-607 011 Div. 18, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ECONOMICS OF DEFENSE PROCUREMENT AND SMALL BUSINESS,
by David Novick and J. Y. Springer.
15 Aug 58, 28p P-1462

Unclassified report

Descriptors: (*Armed forces procurement, Economics), (*Economics, Armed forces procurement), Logistics, Ordnance, Weapons, Defense systems, Costs, Commerce, Weapon systems, Department of Defense, Industries, Government procurement, Statistical data, United States government.

This paper examines the magnitude and nature of military procurement and the special commercial considerations involved. The analysis concentrates on specialized military equipment and gives only passing attention to the problems of doing business with the military in such commodities as shoes, clothing, typewriters, meat and vegetable products, and a multitude of other items that the services buy that are similar to or identical with standard articles of commerce. The main concern of this study, therefore, is centered on the economics of procurement of weapons and the related and specialized equipment essential to their operation. Of necessity it includes components, materials, special products, and services required for weapons and their directly related equipment.

AD-607 015 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MILITARY THOUGHT AND POLITICS IN THE U.S.S.R.
by Myron Rush. 26 Aug 58, 11p P-1469

Unclassified report

Prepared for presentation in The New Leader magazine.

Descriptors: (*Military strategy, USSR), (*USSR, Military strategy), Nuclear weapons, Strategic weapons, Strategic warfare, Military publications, Armed forces (Foreign), Reviews.

What is Soviet thinking on the fantastic new weapons. In any future war, what would be their mission. How are they expected to contribute to victory. More generally, what is Soviet military doctrine (the principles governing the employment of military forces in combat) and Soviet military strategy (plans for achieving specific objectives) in the nuclear age. These are the questions posed by Dr. Garthoff, and in quest of the answers he has examined Soviet military organization, force structure, and military posture to determine their bearing on Soviet doctrine and strategy.

AD-607 018 Div. 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE DELICATE BALANCE OF TERROR,
by Albert Wohlstetter. 6 Nov 58, rev. Dec 58,
46p P-1472

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Deterrence, Cold war), (*Defense systems, Deterrence), (*Foreign policy, United States Government), Nuclear warfare, Disarmament, Public opinion, Strategic air command, Warning systems, Strategic warfare, Nuclear weapons, Limited war.

The assumption that a general thermonuclear war is extremely unlikely is held in common by most of the critics of our defense policy as well as by its proponents. Because of its crucial role in the Western strategy of defense, the stability of the thermonuclear balance which, it is generally supposed, would make aggression irrational or even insane is examined. The balance is believed to be precarious, with critical implications for policy. Deterrence in the 1960's will be neither inevitable nor impossible but the product of sustained intelligent effort, attainable only by continuing hard choice. As a major illustration important both for defense and foreign policy, the particularly stringent conditions for deterrence which affect forces based close to the enemy, whether they are U. S. forces or those of our allies, under single or joint control are discussed. Also considered are the inadequacy as well as the necessity of deterrence, the problem of accidental outbreak of war, and disarmament.

AD-607 019 Div. 18, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE DISTRIBUTION OF RADIAL ERROR AND ITS STATISTICAL APPLICATION IN WAR GAMING,
by H. P. Edmundson. 29 Aug 58, 31p P-1473

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Game theory, Warfare), (*Errors, Distribution), Statistical analysis, Targets, Circular error probable, Mathematical models, Detonations, Functions.

The report presents a unified treatment of the assumptions and theorems concerning the distribution of radial error, and demonstrates its statistical application in war gaming. The density function and cumulative distribution function of the radial error are derived and graphed for one, two, and three dimensions. For each of these cases, formulas are given for the expectation, standard deviation, and median of the radial error. Tables of pertinent conversion are proveded. Results are given for the distribution of detonation points in three dimensions that are useful in war games employing atomic rockets or torpedoes. (Author)

AD-607 127 Div. 18, 20
OTS Prices: HC $4.00/MF $0.75

Conesco, Inc., Cambridge, Mass.
DESCRIPTION, EXPERIMENTAL CALIBRATION, AND ANALYSIS OF THE RADIATION TEST FACILITY AT THE PROTECTIVE STRUCTURES DEVELOPMENT CENTER.
Technical rept.
by C. McDonnell, J. Velletri, A. W. Starbird, and J. F. Batter. 1 Sep 64, 110p
Contract DA18 020ENG3096
PSDC TR14

Unclassified report

Legibility of this document is in part unsatisfactory.

Descriptors: (*Shelters, Models (Simulations)), (*Radiological contamination, Shelters), Calibration, Dose rate, Dosimeters, Radiation monitors, Steel, Structures, Civil defense systems, Radioactive fallout, Shielding, Instrumentation, Test equipment, Cobalt, Equations, Geometric forms, Standardization, Experimental data.

19. Navigation

AD-606 983 Div. 19, 6, 8
OTS Prices: HC $2.00/MF$0.50

Illinois Univ., Urbana. Engineering Experiment Station.
A PERMANENT RECORDER FOR RADIO DIRECTION FINDING CRT BEARING DISPLAY UNITS.
Radiolocation Research Lab. technical note,
by Charles Jack Hawley. Aug 64, 45p RRL-251
Contracts DA36 039SMC03720E, Nonr1834 02,
Proj. NR371 161

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Direction finding, Television display systems), (*Facsimile recording systems, Direction finding), (*Television display systems, Direction finding), (*Radio navigation, Television display systems), Cathode ray tube screens, Panoramic scanners, Photoelectric cells (Semiconductor), Radio equipment, Direction finding signals, Recording systems.

A system enabling permanent recording from cathode ray tube bearing display units has been described and its performance demonstrated. The system was seen to operate well in the bearing versus time mode of recording. The recorder is versatile in that it can record from any CRT display using a line or tip trace inclined at some angle with the vertical axis as the bearing information.

AD-607 184 Div. 19, 8, 25
OTS Prices: HC $4.00/MF $0.75

ITT Federal Labs., Nutley, N. J.
SOLID STATE TACAN RECEIVER-CODER.
Final rept. no. 1,
by N. R. Ascione and J. C. Cozzie. Feb 64, 114p
Contract AF19 604 8352
ESD TDR64 235

Unclassified report

Descriptors: (*Radio navigation, Radio receivers), (*Radio receivers, Coding), Semiconductor devices, Radio communication systems, Pulse communication systems, Radio beacons, Navigational aids, Design, Wiring diagrams, Modules (Electronics), Amplifiers, Decoding, Circuits, Transponders.

The design of a solid state receiver coder for use as part of a TACAN ground station is given. A detailed description of the deliverable breadboard from both its physical and electrical aspects is given, together with test results obtained to date and recommendations for further development. (Author)

AD-607 248 Div. 19, 33
OTS Prices: HC $5.00/MF $1.00

Federal Aviation Agency, Washington, D.C.
NAS CHART OVERLAYS FOR THE SYSTEM DESIGN TEAM, SUPPLEMENT NO. 2.
Memorandum rept.,
by Richard G. Brown and Harry L. Lamb. Jul 64, 190p
Proj. 141 411 05A
FAA RD64 97

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Maps, Navigational aids), (*Navigational aids, Maps), Ranges (Distance), Low frequency, Beacons, Direction finding stations, Very high frequency, Ultrahigh frequency, Air traffic control systems, Air traffic control terminal areas, Air transportation, design.

Supplement No. 2 is the second addition to the Memorandum Report, NAS Chart Overlays for the System Design Team, July 1963. Reproductions of four additional NAS overlays and eight administrative overlays are presented. The administrative overlays describe the various Offices and related boundaries of the Federal Aviation Agency within the Continental United States. (Author)

Bayes Theorem. The major experimental issue was whether or not these would aid the commander in his hypothesis evaluation. Also investigated was the effect of data-processing load upon system operation. Although some improvement in the posterior probabilities estimates resulted from the commander's having access to the hypothesis-evaluation aid and this improvement became more pronounced as system load increased, the main-order effect of access to the aid was not found to be statistically significant. (Author)

AD-607 263 Div. 18, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME DESIGN CONSIDERATIONS FOR A TACTICAL OPERATIONS MODEL,
by L. J. Craig. Sep 64, 17p P-2974
Unclassified report

Prepared for presentation at the Congress on the Information System Sciences (No. 2), Hot Springs, Va., Nov. 64.

Descriptors: (*Military tactics, Simulation), Design, Digital computers, Programming (Computers), Data processing systems, Air traffic control systems, Tactical air command, System engineering.

Computer models or operational simulations are usually designed with some specific applications in mind. The appeal to generality is usually side-stepped by noting that much of the value of simulation can be obtained without an overabundance of detail. That there is much truth in this argument cannot be denied; however, what may be viewed as unnecessary detail to one analyst may be the essence of a highly interesting problem to another. This paper considers some of the pertinent design considerations for a tactical operations' simulation which would attempt to resolve some aspects of this problem. (Author)

AD-607 271 Div. 18, 2, 24
OTS Prices: HC $6.00/MF $1.25

Philco Research Labs., Newport Beach, Calif.
EXPERIMENTS FOR DETERMINING THE EFFECTS OF THE ATMOSPHERE ON LONG RANGE OBLIQUE PHOTOGRAPHY.
Rept. for Jul 63-Jul 64,
by J. H. Atkinson, P. G. McManigal, and B. G. Foster.
Jul 64, 211p
Contract AF33 657 11670, Proj. 6220, Task 622009
AL TDR64 153
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Photographic reconnaissance, Atmosphere), (*Meteorological phenomena, Photographic techniques), (*Atmosphere, Photography), Aerial photography), Atmospheric motion, Lasers, Cameras, Photographic contrast, Effectiveness.

The object of Phase I of the project was to design experiments and appropriate instrumentation for investigating the effects of the atmosphere on reconnaissance photography. These experiments are described in detail in the report along with the basic theory underlying them. The instrumentation is also fully described with drawings and schematic diagrams where available. Experimental sites were investigated and information concerning them is contained herein. The complete program for the performance of the experiments and the manner in which the experimental results will be used to formulate a workable theory of long range oblique photography is outlined. (Author)

24 Sep 58, 16p P-1495

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-606 937.

Descriptors: (*Neutron transport theory, Equations), Neutron flux, Integral equations, Geometry, Stochastic processes, Functions, Probability.

The aim of the paper is to extend previous results and techniques so as to include an extensive category of transport processes involving deterministic and stochastic interactions and general geometries. Characteristic functions and probabilities as well as expected values (fluxes) are determined. (Author)

AD-607 174 Div. 20, 16, 30
OTS Prices: HC $1.00/MF $0.50

Ohio State Univ., Columbus Research Foundation.
RESEARCH ON THE PRODUCTION OF CLINICAL RADIOGRAPHS BY MEANS OF COMPACT, LOW-ENERGY AND HIGH-INTENSITY RADIOACTIVE SOURCES.
Rept. no. 5 (Final), 15 Apr 58-30 Sep 64,
by H. D. Spangenberg and M. L. Pool. 30 Sep 64, 23p
OSURF-834-5
Contract Nonr495 17, Proj. NR105 185

Unclassified report

See also PB-152 865.

Descriptors: (*Radiography, X-rays), (*Radioactive isotopes, Radiography), (*X-rays, Radiography), Gamma rays, Radioactivity, Portable, Non-destructive testing, Tracer studies, Radiochemistry.

Experimental procedures have been carried out to determine the feasibility of the substitution of radioactive nuclides (or isotopes) for conventional x-ray machines in the production of radiograms or roentgenograms. Radioactive nuclides with proper characteristics can be fabricated into a very small portable source. Of approximately 1,300 currently known radioactive nuclides, only 48 appeared to have properties suitable for this purpose and to be worthy of detailed study. The present study indicated that only 11 of these met the criteria essential for eventual clinical usefulness. The criteria chosen were that the radioactive nuclides should (1) be readily available, (2) be capable of easy production, (3) have a half-life of one month or more, (4) possess a suitable emission spectrum, and (5) be capable of providing a high specific activity source. Some of the important properties of the 48 radioactive nuclides, used in their evaluation in accordance with the five criteria, are listed. Although no one nuclide holds first position in each of the above five criteria, nevertheless I(125), Cs(131), Ce(144), Sm(145), Gd(153), Eu(155), Dy(159), Yb(169), Tm(170), Hf(175), and W(181) reasonably satisfy the requirements for isotopic radiography.

AD-607 226 Div. 20, 30
OTS Prices: HC $1.00/MF $0.50

Cyclotron Lab., Harvard Univ., Cambridge, Mass.
CYCLOTRON LABORATORY QUARTERLY PROGRESS REPORT, 1 JUNE-31 AUGUST 1964,
31 Aug 64, 10p

Unclassified report

Descriptors: (*Cyclotrons, Scientific research), Proton scattering, Neutron beams, Nuclear cross sections, Radiobiology, Fission, Fission neutrons, Isotopes, Nuclear spectroscopy, Masers.

Content:
Quasi-free proton-proton scattering, Investigation of the Faraday cup, Neutron total cross sections, n-p incoherent scattering cross section, Biological uses of proton beams, Test of the chew-low extrapolation method, Fission of medium-weight elements, Isotopic ratio studies of stable elements in the marine environment, Nuclear Magnetism and Nuclear Spectroscopy, Research on the properties of nuclei, Nuclear interactions in molecules, Resonance studies with free ions.

AD-607 356 Div. 20
OTS Prices: HC $0.75/MF $0.50

Naval Research Lab., Washington, D. C.
PRESENT STATUS OF DOSIMETRY BY RADIOPHOTOLUMINESCENCE AND THERMOLUMINESCENCE METHODS.
Interim rept.,
by F. H. Attix. 18 Sep 64, 34p
Contract AT49 7 1864, Proj. RR002 06 41 5009; S164444G
NRL 6145

Unclassified report

Descriptors: (*Dosimeters, Luminescence), (*Luminescence, Dosimeters), Radiation measurement systems, Reviews, Phosphorescent materials, Neutrons, Gamma rays, Quantum statistics, Glass, Phosphates, Fluorescence, Calcium compounds, Lithium compounds, Fluorides, Sulfates, Bibliographies.

A review is given of the present status of dosimetry by radiophotoluminescence and thermoluminescence devices, including: principles of operation, types of glasses or phosphors available, types of luminescence-measuring instruments, dose-ranges, precision and linearity obtainable, time-stability of dosimeter response, temperature effects during irradiation and storage dependence upon absorbed dose rate, dependence of response per roentgen upon the effective quantum energy of gamma-radiation, response to neutrons, and dependence of response per rad upon linear energy transfer (LET). A brief historical review of each system is presented. Recent developments in infrared stimulable phosphors for dosimetry are also mentioned. A reference list of 97 items is given. (Author)

AD-607 406 Div. 20, 2, 12
OTS Prices: HC $2.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
SHIELDING REQUIREMENTS FOR RADIATION BELT PARTICLES,
by J. C. Noyes and W. D. Brown. Jan 60, 30p
D1-82-0048

Unclassified report

Also available from the authors.

Descriptors: (*Van Allen radiation belt, Shielding), (*Shielding, Van Allen radiation belt), (*Spacecraft, Shielding), Protons, Attenuation, Polyethylene plastics, Thickness, Dose rate, Electrons, Bremsstrahlung.

The proton energy spectrum in the heart of the inner radiation belt is presented, based on experimental data. The degraded spectra resulting from the attenuation of the incident protons by 5, 10 and 20 gm/sq cm of polyethylene are calculated. The air dose rate due to the degraded protons is given as a function of polyethylene shielding thickness. Air dose rates range from 54 r/hr for no shielding to 2 r/hr for 20 gm/sq cm shielding. The bremsstrahlung due to inner-belt electrons is estimated. The dose rate contribution due to bremsstrahlung is considerably less than that due to protons. (Author)

20. Nuclear Physics and Nuclear Chemistry

AD-606 924 Div. 20, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INVARIANT IMBEDDING AND NEUTRON TRANSPORT THEORY - A GENERALIZED APPROACH,
by Richard Bellman, Robert Kalaba, and G. Milton Wing. 7 Feb 58, 10p P-1380
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Neutron transport theory, Equations), Neutron flux, Probability, Integral equations, Neutron cross sections.

In previous papers the theory of invariant imbedding has been applied to a variety of transport problems. Each problem has been treated individually and any change in the geometry of the medium or energy distribution of the neutrons has called for a new investigation. A general method is presented for dealing with many such cases. A single formula is developed which covers most of the problems considered in past work and leads to new results. A few specializations are indicated. (Author)

AD-606 930 Div. 20, 26, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NUCLEAR ENERGY IN THE U.S.S.R.,
by Arnold Karamish. 23 May 58, 10p P-1391
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nuclear energy, USSR), (*USSR, Nuclear energy), Government (Foreign), Leadership, Cold war, Nuclear industrial applications, Radioactive isotopes, Nuclear power plants, Nuclear powered vessels, Nuclear reactors, Synchrocyclotrons, Political science.

The Soviet Government has not published a 'Smyth Report' or any other official description which even in the most general terms describes their overall atomic energy program. As the Russian sputniks have so dramatically demonstrated, it is Soviet policy to give only the vaguest of details on their scientific projects until they have been brought successfully to fruition. Even so, only a fraction of their achievements are exposed to view. Failures and reversals remain secret. Thus, it is virtually impossible for the world to learn of Soviet scientific and planning errors, and the picture which the western world receives often seems to reflect an overwhelming Soviet superiority. It is this biased picture which often influences the military planning and strategies of western nations, and with regard to the industrial applications of atomic energy is certain to influence world economic and political policy.

AD-606 937 Div. 20, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INVARIANT IMBEDDING AND NEUTRON TRANSPORT THEORY. III. NEUTRON-NEUTRON COLLISION PROCESSES,
by Richard Bellman, Robert Kalaba, and G. Milton Wing. 20 Jun 58, 24p P-1408
Unclassified report

Partly sponsored by the U. S. Atomic Energy Commission.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-606 615.

Descriptors: (*Neutron transport theory, Neutron reactions), (*Neutron reactions, Integral equations), Neutron cross sections, Mathematical models, Neutron flux, Probability, Shock waves.

The effects on criticality of neutron-neutron collisions involving annihilation are investigated for one-dimensional, single and multi-group cases. The analytic treatment shows that regardless of the magnitude of the cross section for collision between moving neutrons, there is no critical length (mass). The analogy between this situation and that in hydrodynamics, where the addition of an arbitrarily small viscosity term eliminates the discontinuous shock phenomenon, is indicated. As in earlier papers, the underlying equations are derived using the principle of invariant imbedding. (Author)

AD-606 994 Div. 20
OTS Prices: HC $3.00/MF $0.75

Elementary Particles Lab., Princeton Univ., N. J.
A STUDY OF THE K-PLUS LIFETIME AND THE LONGITUDINAL POLARIZATION OF THE MUON IN K-PLUS MUON-2 AND K-PLUS MUON-3 DECAY.
Technical rept. no. 36,
by Carroll A. Quarles, Jr. 21 Sep 64, 102p
Contract Nonr1858 06
Unclassified report

Presented in partial fulfillment of Doctoral thesis.

Descriptors: (*K mesons, Radiological decay), (*Muons, Polarization), Meson reactions, Nuclear spins, Nutrinos, Radiation measurement systems, Circuits.

In a counter experiment at the Princeton-Penn Accelerator, a precise measurement was made of the K-plus lifetime and the lifetime of the K-plus muon-2 decay mode. The longitudinal polarization of the muon in K-plus muon-2 decay and at two values of the muon energy in K-plus muon-3 decay was also measured. Lifetime data was analyzed with a view toward checking for deviations from a pure exponential decay law. No evidence was found for such deviations. The longitudinal polarization of the muon in K-plus muon-2 decay was found to be -1.01 ± 0.12. For the longitudinal polarization of the muon in K-plus muon-3 decay, we found $P=+0.7 \pm 0.6$ at a muon energy of (191 ± 4) Mev and $P= -0.6 \pm 0.7$ at (231 ± 4) Mev. These data, taken together with other recent measurements of this polarization, are consistent with the constant form factor theory with Zeta = 0.5 and with a partially conserved strangeness changing vector current theory. (Author)

AD-606 998 Div. 20, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INVARIANT IMBEDDING AND NEUTRON TRANSPORT THEORY. IV. GENERALIZED TRANSPORT THEORY,
by Richard Bellman, Robert Kalaba, and G. Milton Wing.

22. Ordnance

AD-607 133 Div. 22, 30
OTS Prices: HC $3.00/MF $0.75

Aerojet-General Corp., Downey, Calif.
SHAPED CHARGE HYPERVELOCITY PROJECTOR ADVANCEMENT AND DATA GATHERING.
Final rept. for Sep 62-Mar 64,
by R. R. Randall. Sep 64, 95p AGC-0708-01(02)FP
Contract AF08 635 2809, Proj. 5841
ATL TR64 66

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Shaped charges, Hypervelocity projectiles), (*Hypervelocity projectiles, Shaped charges), (*Terminal ballistics, Hypervelocity projectiles), Ballistics, Test facilities, Florida, Ranges (Establishments), Firing tests (Ordnance), Vacuum apparatus, Ordnance.

The Eglin hypervelocity range was modified to incorporate vacuum-pumping equipment capable of simulating a pressure equivalent to an altitude of 200,000 ft. within the test chamber. Tests were conducted to verify performance of these modifications and to train Air Force personnel in the techniques and intricacies of data accumulation using the explosive shaped charge projector. At the Chino Hills Laboratory approximately two hundred explosive shaped charge projector experiments were conducted, with particular emphasis given to increasing the mass, velocity, and dispersion of projectiles formed by these projectors. (Author)

AD-607 203 Div. 22, 12, 30
OTS Prices: HC $1.00/MF $0.50

Iowa State Univ., Iowa City.
DATA ACQUISITION AND REDUCTION.
Rept. no. 13 (Final),
by Royce E. Beckett. Aug 64, 18p
Contract DA11 070 5080RD1232, Proj. 517 01 002, Q808

Unclassified report

Descriptors: (*Rocket launchers, Dynamics), Artillery rockets, Launching, Experimental data, Instrumentation; Statistical analysis, Mathematical prediction.

Report contains a statement of the original objective of the contract and the supplements thereto with abstracts of the nine technical reports issued to cover the requirements. The studies concerned data reduction and processing in connection with rocket launcher dynamics.

AD-607 367 Div. 22, 13
OTS Prices: HC $2.00/MF $0.50

Space Technology Lab., Inc., Los Angeles, Calif.
GROUND MOTIONS RESULTING FROM NUCLEAR SURFACE DETONATIONS,
by R. E. Hutton. Feb 60, 50p
STL/TN-60-0000-09099

Unclassified report

Descriptors: (*Nuclear explosions, Shock waves), (*Underground structures, Loading (Mechanics)), Motion, Nuclear explosion damage, Numerical analysis, Mathematical models, Design, Surface burst.

Designers of underground structures require data concerning loads imposed on such structures by ground motions. Ground motion data is frequently presented in terms of ground shock spectra. Shock spectra can be determined experimentally or analytically. The paper presents an approximate analytical model. Results obtained from this model are compared with limited experimental results and are in reasonable agreement. (Author)

21. Nuclear Propulsion

AD-607 304 Div. 21, 14, 17, 20
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROTECTION OF TRANSPORT UNITS WITH NUCLEAR-PROPULSION ENGINES (SELECTED PARTS).
1 Oct 64, 13p
FTD TT64 929; TT 64 71564

Unclassified report

Unedited rough draft trans. of mono. Zashchita Transportnykh Ustanovok s Yadernym Dvigatelem, Moscow, 1961, p. 5-11, 618-619.

Descriptors: (*Nuclear propulsion, Shielding), (*Shielding, Nuclear propulsion), Aircraft nuclear propulsion, Nuclear power plants, Reactor shielding materials, Nuclear powered vessels, Gamma rays, Neutrons, Design, USSR, Reports.

In this collection are presented reports on calculation and experimental investigation on the passage of neutrons and gamma-radiation in various protective media, used in transport nuclear-energy installations, and also on the study of radiation diffusion in media, surrounding these installations. A part of the report is devoted to engineering problems; construction, assembly, selection of materials for the protection of ship installations, rockets, etc. Given are also certain experimental data and descriptions of installations, which can be used for the creation of a protective medium for a nuclear reacter for aircraft engines. This collection of reports is intended for a broad circle of scientific workers and engineers, interested in problems of calculating and constructing reactor protections for transport installations.

AD-607 410 Div. 21
OTS Prices: HC $3.00/MF $0.75

Douglas Aircraft Co., Inc., Newport Beach, Calif.
PARTICLE DISINTEGRATION STUDY FOR RE-ENTERING NUCLEAR AUXILIARY POWER SYSTEMS.
Final rept.,
by F. E. Littman, L. E. Bell, R. R. Koppang, A. H. Malinovsky, and R. Silvestri. Sep 64, 93p
Contract AF29 601 5004, Proj. 1831, Task 183101
WL TDR64 75

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Zirconium alloys, Oxidation), (*Fuels, Particles), (*Reentry vehicles, Fuels), Uranium alloys, Drops, Air, Oxygen, Nitrogen, Particle size, Explosions, Aerodynamic characteristics, Thermodynamics, Induction heating, Auxiliary power plants, Nuclear propulsion.

The purpose of the study was to investigate the oxidation behavior of molten zirconium-10% uranium alloy particles in the presence of air or its components. A theoretical analysis of the aerodynamic and thermodynamic conditions affecting the droplets was carried out. The reaction of molten droplets of 50 to 8000 micron size with nitrogen, oxygen and air was studied at pressures ranging from 3 to 760 torr. The results indicate that the particles of all sizes react more or less completely with the surrounding atmosphere. The reaction of the larger particles is quiet and smooth. The smaller droplets react with explosive violence, disintegrating into very small particles. Only in the latter case, which appears to be limited to particles initially smaller than 400 microns, does the reaction with air contribute to further decrease in particle size. (Author)

Contract Nonr4346 00

Unclassified report

Rept. on task entitled 'A Delineation of the Naval Role in Psychological Operations.'

Descriptors: (*Naval training, Language), (*Language, Naval training), Military psychology, Social communication, Naval personnel, Personnel management, Performance (Human), Culture, Social psychology, Social sciences, Motivation, Education, Attitudes, Learning, Verbal behavior.

A study of foreign languages in Naval psychological operations has been performed with the purpose of beginning to define research problems in the areas of training and operational utilization. Currently, about 1,000 officers and enlisted personnel are annually receiving at least some foreign language training. An analysis of the decisions made in the administration of this training revealed that information about the use of languages in missions was not being systematically employed because such knowledge does not generally exist. An obstacle to the development of this information is the view that skill in a foreign language is a tool in mission performance. The basic approach used to begin to develop an understanding of the relation of languages to missions was through an examination of the function which language usage serves for the foreign national. These functions help identify criteria for planning and evaluating missions and suggest new missions. Analysis of the functions which language training serve for the user, together with other mission analyses, help define criteria for training which prepare him for more effective performance in foreign cultures. (Author)

AD-607 073 Div. 23
OTS Prices: HC $1.00/MF $0.50

Office of Aerospace Research, Washington, D. C.
THE AIR FORCE-OAR CONTRIBUTION TO PROGRAMMED INSTRUCTION.
Monograph no. 1,
by S. V. Martorana. Aug 64, 20p
Proj. 9778
OAR 64 10

Unclassified report

Descriptors: (*Education, Air force research), (*Training, Training devices), Teaching machines, Military personnel, Civilian personnel.

The paper describes the results of a brief examination of documents and reports related to Air Force activities in programmed instruction and the influence this new educational method is having on instructional and training programs, both in military and civilian fields. The documents on which it draws are those available in the files of the Division of Life Sciences and Mathematical Sciences, DCS/Plans and Programs, Hq Office of Aerospace Research (OAR), and in the Directorate of Life Sciences, Air Force Office of Scientific Research, OAR. The purpose of this inquiry was to identify the ways that Air Force interest in, and support of research in the field of programmed instruction assisted significantly in advancing knowledge in the field and in using this knowledge. An additional purpose was to identify the way that advancing knowledge in this field is changing the methodology and techniques of education and training generally. (Author)

AD-607 181 Div. 23, 18
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE HONORED VOCATION OF ENGINEER.
2 Oct 64, 8p
FTD TT64 618; TT 64 71549

Unclassified report

Unedited rough draft trans. from Krasnaya Zvezda (USSR) 1964, no. 5(12221) 7 Jan, p. 1.

Descriptors: (*Engineering personnel, USSR), (*Rockets, Engineering personnel), Nuclear weapons, Weapon systems, Strategic weapons, Armed forces (Foreign), Military personnel, Training, Propaganda.

The leading concern of the Soviet rocket-engineering service is legitimately considered to be all-round preparation of the personnel for complete mastery of the new weapon. The engineers should be skillful trainers of the troops, advocates of everything new in technical training. It is not by chance that the greatest successes are attained by those units where the rocket-engineering service exhibits activity and initiative in teaching and training work and assures the carrying out of every task literally on a high ideological and methodical level.

23. Personnel and Training

AD-606 868 Div. 23, 28
OTS Prices: HC $2.00/MF $0.50

Personnel Research Lab. (6570th), Aerospace Medical Div., Lackland AFB, Tex.
PREDICTING FIRST YEAR ACHIEVEMENT OF AIR FORCE ACADEMY CADETS, CLASS OF 1964.
Yearly validity rept. no. 6,
by Robert E. Miller. Jul 64, 28p
Proj. 7717, Task 771706
PRL TDR64 18

Unclassified report

Descriptors: (*Air force personnel, Psychometrics), (*Office personnel, Selection), Aptitude tests, Intelligence tests, Motivation, Leadership, Personality, Performance tests, Physical fitness, Test methods, Correlation techniques.

Applicants for each Air Force Academy class take a battery of selection tests to establish their qualifications. Entering cadets take an additional battery consisting mainly of nonacademic experimental tests, developed as part of a program for the production of officer selection and classification devices. Both batteries are validated at the end of the fourth class year against academic and nonacademic criteria. In the class of 1964 the criteria were the Academic Standard Score, Cadet Effectiveness Rating (CER), Residualized Cadet Effectiveness Rating (with respect to physical aptitude), Extracurricular Activities Standard Score, Nonacademic Standard Score, and Early Motivational Elimination. Using multiple regression techniques, it was found that there are measures in both the selection and experimental batteries having validity for each of the criteria. Multiple correlations up to .63 were obtained with the Academic score as the criterion, and up to .51 with the CER. Validities are not significantly different from those observed in the class of 1963 for selection tests common to both classes. Previously observed fluctuating validities appear to have stabilized. (Author)

AD-606 915 Div. 23, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PRICE-QUANTITY ADJUSTMENTS IN MULTIPLE MARKETS WITH RISING DEMANDS,
by Kenneth J. Arrow. 7 May 58, 14p P-1364-RC

Unclassified report

This paper is part of an economic analysis of the engineer-scientist market conducted for RAND Corp. in collaboration with A. Alchian and W. Capron.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Economics, Manpower studies), (*Manpower studies, Professional personnel), (*Professional personnel, Manpower studies), Scientific personnel, Engineering personnel, Abundance, Distribution (Economics), Mathematical analysis.

An economic analysis of the engineer - scientist market.

AD-606 919 Div. 23, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE RELATION OF SALARY TO THE SUPPLY OF SCIENTISTS AND ENGINEERS,
by James C. DeHaven. 16 May 58, 36p P-1372-RC

Unclassified report

Prepared for presentation at the Annual Meeting of the American Institute of Chemical Engineers (50th) Philadelphia, Pa., 22 Jun 58.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Scientific personnel, Wages) (*Wages, Scientific personnel), Chemical engineering, Mathematical models, Costs, Industries, Education, Economics, Symposia.

A model is constructed which demonstrates how the pecuniary and non-pecuniary factors of total income may operate on the margin to determine the numbers of people in different occupations. The net present income values at age 18 for several occupations-building construction workers, chemists, and chemical engineers-are calculated using actual income and cost data to show the relevant pecuniary factors which may influence young people in their choices of careers. The implications for three meanings of 'shortage' are discussed in terms of the numbers of people who may choose scientific occupations. Finally, an estimate is made of the future trend of income for chemical engineers in respect to other occupations.

AD-606 971 Div. 23
OTS Prices: HC $3.00/MF $0.75

Personnel Research Lab. (6570th), Aerospace Medical Div., Lackland AFB, Tex.
PROJECT M: DATA DEVELOPMENT AND ANALYSES IN SUPPORT OF OFFICER MANAGEMENT,
by Ray W. alvord. Jul 64, 68p
Proj. 7719, Task 771904
PRL TDR64 19

Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Air force, Officer personnel), (*Officer personnel, Statistical data), (*Personnel management, Officer personnel), Air force training, Military requirements, Selection, Education, Correlation techniques, Air force personnel.

Project M has been broadened from the original concept of a limited longitudinal study of careers of Regular officers commissioned since 1959 from selected procurement sources. It now includes all officers commissioned from all important sources since 1955. The information recorded for each officer is accumulated periodically for a wide range of categorical variables. This permits description of the total officer population for any year in terms of these variables, and comparison of the characteristics and career potential of officers from different procurement sources. Charts and tabulations illustrate the kind of information available for use in determining management policy. The comprehensive data files may be used not only for projections on the basis of trends, but also to determine selection factors predictive of high quality and high retention rates. (Author)

AD-606 995 Div. 23, 28, 32
OTS Prices: HC $3.00/MF $0.75

Human Sciences Research, Inc., McLean, Va.
THE UTILIZATION OF FOREIGN LANGUAGES IN NAVAL PSYCHOLOGICAL OPERATIONS,
by Gerald C. Bailey. Sep 64, 58p HSR-TN-64/1AS

25. Physics

AD-606 871 Div. 25, 8
OTS Prices: HC $4.00/MF $0.75

Radiation Lab., Univ. of Michigan, Ann Arbor.
A STUDY OF PLASMA APPLICATIONS IN MICROWAVE CIRCUITS-II.
Final rept.
by A. Olte and E. K. Miller. Aug 64, 108p
ORA-4915-2-F
Contract AF30 602 2605, Proj. 5573, Task 557301
RADC TDR64 244.

Unclassified report

Descriptors: (*Circuits, Microwaves), (*Microwave networks, Plasma physics), (*Plasma physics, Microwave equipment), Cyclotron resonance phenomena, Magnetic fields, Gas discharges, Absorption, Electrons, Ions, Density, Gas ionization, Magnetohydrodynamics, Hydrogen, Xenon, Cathodes, Mathematical models, Theory.

These studies are concerned with the potential usefulness of plasmas in microwave structures, with or without a static magnetic field. Considerable attention is given to the plasma resonance isolator and to the design and fabrication of an improved plasma package specifically intended for microwave applications. The first part of the report contains the development of a first order theory for calculating the absorption in the electron cyclotron resonance isolator, and its equivalent circuit. Two theoretical models are used to describe the plasma-electromagnetic wave interaction and are found to produce equivalent results for the range of variables investigated. The experimental work on a rectangular plasma package is described in the second part of the report. Hydrogen and xenon gases are used in hot cathode discharges to produce a plasma, and plasma frequencies of more than 10 Gc are obtained. Plasma instabilities were found to be a serious problem.

AD-606 876 Div. 25, 8, 30
OTS Prices: HC $1.00/MF $0.50

Electrical Engineering Research Lab., Univ. of Texas, Austin.
RESEARCH ON SEMICONDUCTORS.
Final rept.
by J. Bardeen and P. Handler. Sep 64, 6p
Contract AF49 638 417, Proj. 9763, Task 37631

Unclassified report

Descriptors: (*Semiconductors, Scientific research), Selenium, Semiconducting films, Optical properties, Electrical properties, Selenium alloys, Tellurium alloys, Impurities, Resistance (Electrical), Tunneling (Electronics), Oxides, Surface properties, Silicon, Germanium, Single crystals, Electrons, Magnetic properties, Lasers.

This report will cover the research work performed in the Semiconductor Laboratory of the University of Illinois during the six year period 1958 - 1964.

AD-606 881 Div. 25, 13, 22
OTS Prices: HC $2.00/MF $0.50

Mitre Corp., Bedford, Mass.
DYNAMIC STRESS CONCENTRATIONS IN AN ELASTIC PLATE WITH RIGID CIRCULAR INCLUSION.
Special rept.,
by yih-Hsing Pao and C. C. Mow. Dec 61, 42p
Mitre-SR-41
AF33 600 39852, Proj. 600

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Mechanical waves, Scattering), (*Stresses, Flexible structures), (*Flexible structures, Stresses), Loading (Mechanics), Structures, Mathematical analysis, Nuclear explosions, Explosion effects, Mechanics.

Stress concentrations around a rigid circular inclusion in a thin, elastic plate during passage of plane compressional waves are examined. The inclusion can be either fixed in space or free to translate with the plate. The dynamic stress concentration factors are found to be dependent upon the incident wave length, Poisson's ratio of the plate, and density of the inclusion. At certain wave lengths the dynamic factors are larger than those encountered in the static case. Very large local stresses might develop if the inclusion is constrained and unable to move freely with the plate. (Author)

AD-606 885 Div. 25
OTS Prices: HC $3.00/MF $0.75

Mithras, Inc., Cambridge, Mass.
MEASUREMENT OF THE SPIN-FLOPPING RELAXATION TIME IN Cu C12.2H2O.
Scientific rept. no. 4,
by Charles S. Naiman and Thomas Lawrence. May 64, 66p MC-62-49-R4
Contract AF19 628 2395, Proj. 5621, Task 562104
AFCRL 64 580

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Antiferromagnetism, Relaxation time), (*Copper compounds, Chlorides), Magnetic materials, Hydrides, Crystals, Phase studies, Cryogenics, Thermodynamics, Magnetic fields, Oscillation, Nuclear spins.

As part of a study of the dynamic properties of magnetic phase transitions, measurement was made of the relaxation time associated with the spin-flopping transition in CuCl2.2H2O. A relaxation time of (0.70 ± 0.15) x 10 to the -7 power seconds at 2.4K. The measurements also yield the temperature dependence of the critical field which is in agreement with previous data. (Author)

AD-606 888 Div. 25
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
LABORATORY FOR STATICS AND PHOTOELASTICITY,
by A. de Marneffe. 10 Aug 64, 12p
RSIC 241; TT 64 71508

Unclassified report

Trans. of Revue Universelle des Mines (France) 1948, ser. 9, v. 4, no. 1, p. 64-66.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Laboratories, Instrumentation), (*Photoelasticity, Measurement), (*Statics, Instrumentation), France, Light, Polarization.

24. Photography and Other Reproduction Processes

AD-606 895 Div. 24, 18
OTS Prices: HC $6.00/MF $1.50

Fairchild Space and Defense Systems, Syosset, N. Y.
IMAGE INTERPRETATION CELL.
Final rept.,
by V. Abraham, A. Dobbs, and J. K. Libby. Aug 64,
268p SME-AA-101
Contract AF30 602 2882, Proj. 6506
RADC TDR64 102

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Optical equipment, Photointrepretation), (*Photointrepretation, Optical equipment), Photographic intelligence, Photographic images, Recording systems, Airborne, Portable.

The purpose of the Image Interpretation Cell is to generate forward echelon accurate intelligence data in the form of Flash and Immediate Photo Interpretation Reports. The IIC is a completely self-contained, deployable and adaptable image data system. It is designed as a highly mobile unit and is capable of sustained operation over a wide range of interpretation tasks. Each Cell accepts all the incoming material which meets the requisites of the overall Limited War Intelligence Reduction Complex (LWIRC) and, from this material, can provide reports within the specified time periods; that is, one hour for Flash Reports, and six hours for Immediate Reports. The IIC is designed for efficient execution of routine photo intelligence operations. All components of the Cell are semi-automated as independent subsystems with built-in capacity for later full automation. They are linked together to perform specific tasks by programmed sequences and intensive computer support. The capabilities of these devices to collate, retrieve, observe, measure, compute and report are applied to the interpretation and processing of multi-sensor intelligence data. (Author)

AD-607 252 Div. 24, 1, 9
OTS Prices: HC $6.00/MF $1.25

North American Aviation, Inc., Los Angeles, Calif.
RESEARCH ON PHOTOGRAPHIC WINDOW PROBLEM IN SUPERSONIC AND HYPERSONIC AIRCRAFT.
Final technical documentary rept. for May 62-Jul 63.
Mar 64, 250p NA-63-717
Contract AF33 657 8013
RTD TDR63 4098

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Photographic windows, Aerodynamic loading), Stresses, Aerodynamic heating, Hypersonic flight, Supersonic flight, Environmental tests, Atmosphere entry, Orbital trajectories, Photographic reconnaissance, Heat transfer, Glass, Simulation, Design, Temperature, Aircraft, Thermodynamics.

The purpose of the contract was twofold: (1) to attempt laboratory verification of the analytically predicted effects of environmentally-stressed windows on photographic image quality, and (2) to perform an engineering investigation directed toward the more precise determination of the window environment to be expected in a hypersonic vehicle, and the feasibility of reducing the severity of such an environment. Both objectives were fulfilled. It is recommended that flight tests be considered in any subsequent program, in order to more closely simulate the environmental factors which affect window performance. It is further recommended that research be directed toward the attainment of a suitable method for direct measurement of temperature distributions within glass panels. (Author)

Structural parts, Viscosity, Elasticity, Plasticity, Loading (Mechanics), Stresses, Straw (Mechanics).

Earlier work which developed a method of computing deformation time and final displacement bounds for rigid-plastic structures and continua subjected to impulsive loading is extended to cover all materials in which stress and strain rate are related in a reversible manner. Particular emphasis is given to rigid-visco-plastic materials and illustrative examples are presented. (Author)

AD-606 993 Div. 25, 14
OTS Prices: HC $3.00/MF $0.75

Acoustics Research Lab., Harvard Univ., Cambridge, Mass.
BILAMINAR CERAMIC FLEXURAL VIBRATORS.
Technical memorandum no. 59,
by Harry A. Schenck. Sep 64, 64p
Contract Nonr1866 24, Proj. NR384 903
Unclassified report

Descriptors: (*Transducers, Ceramic materials), (*Ceramic materials, Vibrators (Mechanical)), (*Vibrators (Mechanical), Ceramic materials), Vibration, Disks, Laminates, Mechanical properties, Piezoelectric crystals, Anisotropy, Resonance, Electromechanical converters, Electroacoustic transducers, Equations of state, Boundary value problems, Equations, Beams (Structural), Theory.

A differential equation and boundary conditions that govern the electrically forced flexural vibrations of bilaminar ceramic plates, and analogous one-dimensional equations appropriate for narrow rectangular beams, are developed from linear equations of state for a piezoelectric material. Formulas for the electrical input admittance of a bilaminar plate or beam are given. The effect of shear and rotary inertia on the resonance frequencies of free-edge disks and free-free beams is evaluated. A systematic procedure for calculating the significant elastic, piezoelectric, and dielectric properties of the ceramic transducer from impedance and admittance data is developed, and typical values of these parameters are determined. A brief description of the equivalent circuit of a bilaminar ceramic flexural vibrator is included. (Author)

AD-606 996 Div. 25
OTS Prices: HC $3.00/MF $0.75

Lockheed Missiles and Space Co., Sunnyvale, Calif.
LIGHT DIFFRACTION BY ULTRASONIC WAVES AS A MULTIPLE SCATTERING PROCESS.
Technical rept.,
by H. V. Hance. Jul 64, 84p
LMSC-6-74-64-35
Unclassified report

Descriptors: (*Light, Diffraction), (*Ultrasonic radiation, Electromagnetic wave reflections), Optics, Electromagnetic waves, Mechanical waves, Scattering, Numerical analysis, Iterative methods, Graphics.

The phenomenon of light diffraction by ultrasonic waves has been studied extensively in the past, but quantitative investigations have been limited in scope, probably because of computational difficulties. Recently, there has been developed a method of analysis that allows numerical computation for arbitrarily specified conditions to be carried out on a digital computer. This method, which employs approximate theory and an iterative process, is used in this study to investigate the ultrasonic diffraction effect over a wide range of conditions. When the ratio of light wavelength to ultrasonic wavelength is small compared to unity, the theoretical development on which this numerical analysis is based shows that the intensities in the various diffraction orders are determined by three nondimensional parameters. These parameters are related to three physical parameters of the ultrasonic beam-wavelength, intensity, and width-and two physical parameters of the light beam-wavelength and incidence angle. Special attention is given to the variation of diffracted-beam intensity with variation of the parameters about values that produce strong Bragg scattering into the -1st order. These conditions are of particular interest because of the possibility of diverting all incident-beam power into one diffraction order under control of the ultrasonic beam. In addition, the conditions required for strong Bragg diffraction into the -2nd order are determined. (Author)

AD-606 997 Div. 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE HOMOLOGY GROUPS OF A LATTICE,
by Jon Folkman. Oct 64, 16p RM-4253-PR
Contract AF49 638 700
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Crystal lattices, Geometric forms), Crystal structure, Crystallography, Mathematical analysis, Invariance.

A determination is made of the homology groups of an important class of lattices called geometric lattices. (Author)

AD-607 017 Div. 25, 8, 19
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INVARIANT IMBEDDING AND WAVE PROPAGATION IN STOCHASTIC MEDIA,
by Richard Bellman and Robert Kalaba. 29 Aug 58, 25p P-1471
Unclassified report

Descriptors: (*Invariance, Wave transmission), (*Wave transmission, Stochastic processes), (*Stochastic processes, Equations), Electromagnetic waves, Propagation, Electromagnetic wave reflections, Refraction, Scattering, Statistical functions, Probability, Monte Carlo method, Theory.

The principle of invariant imbedding leads to the formulation of various functional equations describing plane wave propagation in stochastic media. The approach involves first the derivation of stochastic functional equations for reflection and transmission coefficients, followed by the taking of expected values of appropriate functions of the random state variables. This makes possible the determination of their characteristic functions and distribution functions, by means of still other functional equations, or by computational schemes of the Monte Carlo type. The particular example in which a plane wave is incident on a stratified slab which is characterized by stochastic wave numbers in each stratum is discussed. The distribution functions for the amplitude of the random reflected and transmitted waves are then determined as functions of the thickness of the slab. The effects of multiple scattering are taken into account.

AD-607 022 Div. 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.

AD-606 889 Div. 25, 7
OTS Prices: HC $2.00/MF $0.50

AVCO-Everett Research Lab., Everett, Mass.
EXPERIMENTAL STUDIES OF STRONG HALL EFFECTS AND VXB INDUCED IONIZATION,
by J. Klepeis and R. J. Rosa. Sep 64, 44p
Avco-RR-177
Contracts AF04 694 33 and AF04 694 414
BSD TDR64 20

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Magnetohydrodynamics, Generators), (*Hall effect, Magnetohydrodynamics), (*Gas ionization, Magnetohydrodynamics), Heaters, Electrodes, Graphites, Electrodes.

The document recounts studies performed during the last three years using a graphite inert gas heater, typical flow conditions being 100gm/sec argon at one atmosphere pressure and 1800 to 2000 Kelvin seeded with 0.1 to 1% cesium vapor. The aim of work was primarily to study MHD channel and electrode performance at high values of Omega (TAU) (5 to 15) and secondarily, to look for the occurrence of extra-thermal ionization. Many different channel and electrode configurations were tested. Straight segmented electrode channels did not perform well, apparently due to nonuniformity created by extra-thermal ionization over the electrode walls. Channel geometries in which the normal current closes upon itself performed much better and substantial enhancement of the power output due to V x B induced ionization was observed. The results correlate well with results obtained in applied electric fields and with theory when energy loss due to radiation is included. (Author)

AD-606 891 Div. 25, 17
OTS Prices: HC $5.00/MF $1.00

Westinghouse Electric Corp., Youngwood, Pa.
GALLIUM ARSENIDE DENDRITE SINGLE CRYSTAL PROGRAM.
Final rept. for Mar-Dec 63,
by M. F. Amsterdam, R. H. Moss, and S. O'Hara. May 64, 154p
Contract AF33 657 8162, Proj. 7 803
ML TDR64 129

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Solar cells, Materials), (*Gallium alloys, Arsenic alloys), (*Single crystals, Crystal growth), Laboratory furnaces, Melting, Manufacturing methods, Germanium, Epitaxial growth, Indium compounds, Antimony compounds, Experimental data, Semiconductors.

The results of experiments on dendritic and web growth of gallium arsenide are described and discussed. Solar cell fabrication processes have been developed which are ideally suited to webbed starting material. A solar cell made on gallium arsenide multi-dendrite web was comparable to those made on Czochralski crystal slices. GaAs has been epitaxially grown on Ge web. (Author)

AD-606 894 Div. 25
OTS Prices: HC $2.00/MF $0.50

AVCO-Everett Research Lab., Everett, Mass.
AN EXPERIMENTAL AND THEORETICAL STUDY OF MHD IONIZING FRONTS,
by R. M. Patrick and E. R. Pugh. Sep 64, 48p
Avco-RR-188
Contract AF49 638 1129

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Magnetohydrodynamics, Gas ionization), Mechanical waves, Propagation, Momentum, Thermodynamics, Plasma medium, Electric fields, Magnetic fields.

An experimental and theoretical description of ionization fronts propagating into hydrogen with a bias magnetic field in the plane of the front is presented. The experimental evidence showed that the absolute light intensity behind the front corresponds to a fully ionized plasma. The density ratio was obtained by measuring the magnitude of the current in the front, the front speed, and using the equation of mass and momentum. The front speeds are small compared to the Alfven velocity and are characterized by a critical velocity, i.e., the velocity a molecule must have so the kinetic energy equals the energy necessary to ionize it. A theory for the ionization front was developed which neglects the plasma pressure and abandons the condition E = V x B both ahead and behind the front. The theory predicts the front velocity and the rather unusual variation of the density ratio across the fronts with the front speed. (Author)

AD-606 912 Div. 25, 13, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ELASTIC EQUILIBRIUM OF A PLATE WITH A REINFORCED ELLIPTICAL HOLE,
by E. Levin. 5 May 58, 26p P-1360

Unclassified report

Results presented in this paper are based on Part I of a doctoral thesis submitted by the author to the Univ. of Calif. at Los Angeles in 1955.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Structural parts, Stresses), Metal plates, Elasticity, Loading (Mechanics), Rings, Boundary value problems, Moments, Deformation, Reinforcing materials, Conformal mapping, Transformations (Mathematics).

An infinite thin plate with an elliptical hole reinforced by a confocal elliptical ring is subjected to loads in the plane. A solution to the generalized plane stress problem is obtained using the complex variable techniques of Muskhelishvili. The result is presented in a form well-suited to evaluation by digital computers. Specialization to a circular hole with a negligibly thin reinforcement is shown to be in agreement with results obtained by other authors. (Author)

AD-606 960 Div. 25
OTS Prices: HC $2.00/MF $0.50

Brown Univ., Providence, R. I.
TIME AND DISPLACEMENT BOUND THEOREMS FOR VISCOUS AND RIGID-VISCO-PLASTIC CONTINUA SUBJECTED TO IMPULSIVE LOADING.
Rept. no. 4,
by J. B. Martin. Aug 64, 33p
Contract N189 181 57827A X

Unclassified report

Descriptors: (*Continuum mechanics, Theorems),

Descriptors: (*Lasers, Design), (*Amplifiers, Lasers), Crystals, Reflection, Gain, Theory, Transmission lines, Oscillators, Optical filters, Detectors, Light pulses, Attenuation.

A theoretical and experimental study was carried out on laser amplification. A transmission system was set up with an oscillator, filter, amplifier, and detector. By controlling the relative time delays in firing or by changing the power input to the amplifier the properties of transmitted power gain were studied. It was found that both the oscillator and amplifier rubies in uncoated form could be made to oscillate for about 100 microsec giving a well-defined pulse of quasi cw operation. The gain of the amplifier increased as the times of the signal from the oscillator approached the time at which the amplifier went into oscillation. If the oscillator was delayed so that its signal occurred at increasing time after the amplifier oscillations had ceased, the power gain decreased, even though the amplifier crystal was still being pumped. Finally with still further delay in signal relative to the amplifier oscillation period, an attenuation in transmission was observed. (Author)

AD-607 060 Div. 25, 26
OTS Prices: HC $3.00/MF $0.75

Motorola Inc., Phoenix, Ariz.
EPITAXIAL CONTROL SYSTEM.
Final rept.,
by Don M. Jackson, Jr. 14 May 64, 60p
Contract AF19 604 8351, Proj. 5621, Task 562103
AFCRL 64 582

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Silicon, Epitaxial growth), (*Single crystals, Epitaxial growth), (*Epitaxial growth, Control systems), Vapors, Impurities, Gas analysis, Mass spectroscopy, Spectrum analyzers, Control panels, Meters, Samplers, Operation, Calibration, Instruction manuals.

The epitaxial vapor analysis system was delivered, installed, and successfully tested. The system consists of two main sections - the analyzer console which is built about a small, 90 degree sector, highly sensitive mass spectrometer; and the gas control console which serves to meter and control all gases to an epitaxial reactor with special provision for the diversion of various gas streams to the analyzer console for monitoring purposes. The analyzer section has provisions for either continuous or batch sampling. The gas control console is a completely automatic, multi-layer epitaxial growth system. The report consists for the most part of operational instructions for the system. (Author)

AD-607 069 Div. 25
OTS Prices: HC $6.00/MF $1.25

Edgerton, Germeshausen and Grier, Inc., Boston, Mass.
RADIANT PROPERTIES OF HIGH TEMPERATURE EQUILIBRIUM AIR (3800A TO 6500A),
by Ernest N. Ashley, Jr. 22 May 64, 222p
EGG-B-2782
Contract DA49 146XZ188, Task 12 028
DASA 1506

Unclassified report

Descriptors: (*Air, High temperature research), (*Absorption, Air), (*Emissivity, Air), Light, Heat transfer, Transport properties, Diatomic molecules, Density, Stability, Band spectrum, Mathematics, Electron transitions, Tables.

The linear spectral absorption coefficient and related radiative quantities have been computed for high-temperature equilibrium air for optical wavelengths within the range of 3800A to 6500A. The computations were performed over temperatures from 1000K to 24,000K, and for density ratios from 1 to 0.000001. Quantities computed include; the linear absorption coefficients for the radiating constituents of high-temperature air, the total absorption coefficient, the spectral emissivity and radiance of a 1 centimeter layer of air, and mean emissivities, radiances, and absorption coefficients for the optical band. A description of the theoretical considerations which served as the basis of calculations is given. The results of the computations are presented in the form of graphs and tables covering the specified wavelength, temperature and density regions. (Author)

AD-607 075 Div. 25, 9
OTS Prices: HC $1.00/MF $0.50

Yale Univ., New Haven, Conn.
PERSISTENT HYDRODYNAMIC CURRENTS IN HE II. FIELD HOMOGENIZATION BY SUPERCONDUCTING HOLLOW CYLINDER.
Annual summary rept. for 1 Oct 63-30 Sep 64,
by C. T. Lane. 30 Sep 64, 7p
Contract Nonr609 33

Unclassified report

Descriptors: (*Helium, Hydrodynamics), (*Superconductors, Magnetic fields), Liquefied gases, Cylindrical bodies, Containers, Momentum, Thermodynamics, Solenoids, Field theory, Reviews.

AD-607 082 Div. 25, 4, 8
OTS Prices: HC $3.00/MF $0.75

Battelle Memorial Inst., Columbus, Ohio.
STUDY OF SEMICONDUCTING PROPERTIES OF SELECTED RARE-EARTH METALS AND COMPOUNDS.
Final technical rept.,
by J. F. Miller, F. J. Reid, L. K. Matson, J. W. Moody, and R. D. Baxter. 12 Oct 64, 90p
Contract AF33 657 10687, Proj. 4150, Task 415002
AL TDR64 239

Unclassified report

Descriptors: (*Semiconductors, Rare earth elements), (*Rare earth elements, Semiconductors), Cerium, Neodymium, Samarium, Gadolinium, Erbium, Ytterbium, Selenium, Tellurium, Oxygen, Arsenic, Antimony, Phosphorus, Nitrogen, Crystal growth, Synthesis (Chemistry), Phase studies, Electrical properties, Atomic energy levels, Thermistors, Thermoelectricity.

The investigation was concerned with the compounding, crystal growth, characterization, and evaluation of compounds formed between the rare-earth elements and elements of chemical Groups V and VI. Special emphasis is placed on providing basic information to make possible the ultimate development of useful solid-state electronic devices based on these materials. In sampling the members of the rare-earth family, the elements cerium, neodymium, samarium, gadolinium, erbium, and ytterbium were used in the preparation of representative compounds and alloys with anions, such as, selenium, tellurium, oxygen, arsenic, antimony, phosphorus, and nitrogen. Single crystal, bulk, and thin-film specimens were prepared, and details regarding methods of compounding and crystal growth are given. Several applications of rare-earth compounds and alloys studied are suggested. (Author)

ON THE POSSIBILITY OF AN ENERGY GAP IN THE SPECTRUM OF A DEGENERATE FERMI LIQUID,
by Richard A. Ferrell. 29 Aug 58, 12p P-1482
Unclassified report

Descriptors: (*Fermions, Liquids), (*Superconductors, Fermions), Field theory, Invariance, Spectroscopy, Nucleons, Electrons, Crystal lattices, Atomic energy levels, Excitation.

It is proved on the basis of Galilean invariance that a degenerate liquid of identical interacting Fermions possesses excited states corresponding to arbitrarily small energies of excitation. Thus there is no energy gap in the spectrum of infinite nuclear matter and there is an essential difference between nuclear matter and the electron gas in a superconductor. In the latter the lattice provides a preferred frame of reference so a gap in the energy spectrum is not ruled out by considerations based on Galilean invariance. (Author)

AD-607 028 Div. 25, 3, 4
OTS Prices: HC $2.00/MF $0.50

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
A STUDY OF SURFACE PHENOMENA ON ORGANIC SOLIDS.
Quarterly progress rept. no. 1, 10 Jun-9 Sep 64,
by P. J. Reucroft, P. Chairge, and M. M. Labes.
18 Sep 64, 26p Q-B2227-1
Contract18 035AMC141A
Unclassified report

Descriptors: (*Organic materials, Surface properties), (*Filters (Fluid), Surface properties), Absorption, Measurement, Helium, Krypton, Ammonia, Test equipment, Solid state physics, Crystals, Powders.

A volumetric adsorption system designed to measure adsorption on low specific surface area organic solid powders was constructed and calibrated. Preliminary measurements indicated that the apparatus is able to measure adsorption onto samples as low as 50 2 sq cm in area. (Author)

AD-607 032 Div. 25, 18
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
CHARACTERISTICS OF A PHOTON COUPLED AMPLIFIER.
Master's thesis,
by William F. Grieder. Aug 64, 71p
AFIT GA/EE/64 5
Unclassified report

Descriptors: (*Amplifiers, Photoelectric cells (Semiconductor)), (*Photons, Amplifiers), (*Semiconductor devices, Amplifiers), Diodes (Semiconductor), Light, Electrical impedance, Luminescence, Frequency, Voltage, Design.

This report contains a study of the small-signal characteristics of a photon coupled amplifier (PCA). An audio frequency model for the PCA is proposed based on measured static characteristics from six prototype units. The model is used to derive performance characteristics of a common emitter PCA configuration. Results indicate that PCA output impedance and voltage gain are high while input impedance and current gain are low, and that voltage gain can exceed 2000 for high resistive loads. Theoretical performance is verified with measured data from a breadboard circuit. Temperature effects on PCA performance are discussed using experimental data. (Author)

AD-607 034 Div. 25, 5
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN EXPERIMENTAL INVESTIGATION OF GERMANIUM DIODES OF VARIOUS GEOMETRIES AS INFRARED MODULATORS.
Master's thesis,
by Larry Alan Darda. Aug 64, 77p
AFIT GE/EE/64 4
Unclassified report

Descriptors: (*Diodes (Semiconductor), Infrared pulses), (*Infrared pulses, Absorption), (*Modulators, Infrared pulses), Germanium, Light, Infrared communication systems, Semiconductor devices, Design, Statistical data, Theory.

Two newly designed germanium diodes are investigated to determine their infrared absorption properties as a function of current. Both designs work well but can be improved through better junction formation methods and through the use of lower resistivity material. It is shown that the process of free-carrier absorption is independent of the size or shape of the device, thus allowing considerable freedom in selecting more compact and efficient designs. A new design is proposed which includes the best features of the rectangular and trapezoidal modulators.

AD-607 047 Div. 25
OTS Prices: HC $5.00/MF $1.00

Gordon McKay Lab. of Applied Science, Harvard Univ., Cambridge, Mass.
THE EFFECT OF PRESSURE ON OPTICAL PROPERTIES OF SEMICONDUCTORS.
Technical rept. no. HP-12,
by Richard Zallen. Aug 64, 185p
Contract Nonr1866 10, Proj. NR017 308
Unclassified report

Descriptors: (*Semiconductors, Optical properties), (*Optical properties, Semiconductors), Pressure, Hydrostatic pressure, Spectra (Infrared), Spectra (Visible and Ultraviolet), Band spectrum, Gallium compounds, Phosphorus compounds, Germanium, Silicon, Indium compounds, Arsenic compounds, Gallium alloys, Antimony alloys, Absorption spectrum.

This report describes measurements of the effect of hydrostatic pressure on optical properties of group 4 and group 3-5 semiconductors in the infrared, visible, and near-ultraviolet regions of the spectrum. The results of these experiments provide evidence in support of the following empirical rule inferred previously from earlier work on pressure effects: Energy separations of corresponding electronic states in related materials change with pressure at nearly the same rate. The correlation between pressure coefficient and transition type permits investigation of electronic energy-band structure by means of optical-pressure experiments. This approach was taken to study the band structure of GaP. (Author)

AD-607 057 Div. 25
OTS Prices: HC $3.00/MF $0.75

Army Electronics Labs., Fort Monmouth, N. J.
DESIGN THEORY FOR LASER AMPLIFIERS,
by H. Jacobs, F. A. Brand, S. Weitz, and C. Lo Cascio.
Jul 64, 78p
Proj. IG6 22001A056 03 00
USAEL TR2486
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

THE INTERNAL FIELD OF A n-PARAFFIN CRYSTAL.
Technical rept. no. 71 (NSF progress rept. no. 3),
by Richard S. Stein. 7 Aug 64, 33p
Contract Nonr3357 01; Grant NSF GP1693,
Proj. NR056 378

Unclassified report

Descriptors: (*Aliphatic compounds, Crystals), (*Anisotropy, Aliphatic compounds), Crystal substructure, Polarization, Chemical bonds, Field theory, Vector Analysis, Polymers.

AD-607 109 Div. 25, 9, 30
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
THEORY OF ELECTRON DRIVEN SHOCK WAVES,
by R. G. Fowler and B. D. Fried. 16 Sep 60,
17p STL/TR-60-0000-GR310
PB 153 464

Unclassified report

Descriptors: (*Shock waves, Theory), (*Gas ionization, Shock waves), Electrons, Plasma physics, Fluid dynamic properties, Mathematical analysis, Shock tubes.

Previous calculations of the time required for ion heating in the discharge or driver section of an electrical shock tube yielded values much greater than that in which formation and acceleration of the first luminous front is observed to occur. The model of an electron driven shock presented here shows that the relation between shock velocity, V, and electron temperature, T sub e, which has been established experimentally over a wide range of parameters, remains valid even though the conventional picture of a shock driven by hot ions must be abandoned. Thermal expansion of the hot electron gas accelerates the cold ions, resulting in a shock front or moving electrostatic double layer. Assuming conditions behind the shock to be coupled to those in the discharge region through a simple rarefaction wave, it is found that MV(2)/kT sub e is a universal function of W/MV(2), where W is the effective ionization potential. This is shown to be in excellent agreement with a wide variety of experimental data. (Author)

AD-607 115 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command,
Wright-Patterson AFB, Ohio.
APPLICATION OF THE METHOD OF CONSECUTIVE APPROXIMATIONS IN THE DESIGN OF RIBBED SHELLS,
by V. M. Ryabov. 21 Sep 64, 16p
FTD TT64 418; TT 64 71523

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, 1963, no. 6, p. 150-154.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Structural shells, Design), (*Numerical methods and procedures, Loading (Mechanics)), Reinforcing materials, Cylindrical bodies, Stresses, Deflection, Numerical analysis, USSR.

This article describes a method which permits improving the solution for a structurally orthotropic shell by means of consecutive approximations taking into account local stresses in the facing together with an evaluation of the error in determining the basic stresses in the original scheme of the anisotropic shell. The entire discussion is directed toward a circular cylindrical shell reinforced along the lines of major curvature but in principal may be extented to shells of more complex form, e.g. to cylindrical shells reinforced along lines of major curvature or to shells having the shape of surfaces of revolution.

AD-607 141 Div. 25, 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command,
Wright-Patterson AFB, Ohio.
QUANTUM NATURE OF LIGHT AND INTERCONNECTION OF SIGHT CHARACTERISTICS,
by V. K. Kagan. 24 Sep 64, 19p
FTD TT64 489; TT 64 71534

Unclassified report

Unedited rough draft trans. of Svetotekhnika (USSR) 1962, v. 8, no. 5, p. 7-12.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Illumination, Quantum statistics), (*Quantum statistics, Illumination), (*Vision, Quantum statistics), Light signals, Communication theory, Photons, Absorption, Optics, Equations, USSR.

AD-607 153 Div. 25, 17
OTS Prices: HC $2.00/MF $0.50

Materials Research Corp., Orangeburg, N. Y.
THIN FILM TECHNIQUES IN THERMOELECTRICITY.
Semi-annual rept. for 20 Oct 61-31 Mar 62,
by M. Levy, H. Gurev, J. Silgailis, and H. Klints.
2 May 62, 30p MRC-296
Contract NObs86216, Proj. SR007 12 01, ARPA Order 219 61

Unclassified report

Descriptors: (*Thermoelectricity, Metal films), (*Metal films, Thermoelectricity), Bismuth alloys, Telluruim alloys, Selenium alloys, Antimony alloys, Copper alloys, Bromine compounds, Vapor plating, Resistance (Electrical), Impurities, X-ray diffraction analysis, Aging (Materials).

An investigation was made of the properties of thin film evaporated thermoelectric materials. Layers of either n or p-type can be formed with electrical characteristics approaching those of bulk materials. Variations in the properties can be made through controlled evaporation rate and substrate temperature. X-ray studies of the deposited films have been undertaken as well as preliminary Hall measurements made on some films. Diffraction patterns both of bulk materials and films are highly complex and although certain correlations of electrical properties and structure have been observed, detailed interpretations of the patterns have not been possible up to this time. Annealing studies have shown that marked changes can be made in film properties principally in the direction of improvement.

AD-607 183 Div. 25, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command,
Wright-Patterson AFB, Ohio.
A DEVICE TO DETERMINE THE TEMPERATURE OF PLASMA,
by G. A. Boberskii. 29 Sep 64, 7p
FTD TT64 604; TT 64 71547

Unclassified report

AD-607 083 Div. 25, 14
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
PHOTO-ELASTICITY OF POLYMERS, I,
by Jiro Tsuji and Kozo Kawada. 22 Sep 64, 25p
RSIC 277; TT 64 71517

Unclassified report

Trans. of Oyo Butsuri (Japan) 1964, v. 33, no. 9, p. 387-394.

Descriptors: (*Polymers, Photoelasticity), (*Photoelasticity, Polymers), Crystals, Optical properties, Refractive index, Polarizing filters, Thermal properties, Stresses, Refraction, Transition temperature, Elastomers.

AD-607 087 Div. 25
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
THERMAL CONDUCTIVITY IN THE LAYER FORMED BY SURFACE IRREGULARITY,
by V. M. Kapinos and O. T. Il'chenko. 22 Sep 64, 22p
RSIC 281; TT 64 71518

Unclassified report

Trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Energetika (USSR) 1958, v. 1, no. 9, p. 77-89.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Thermal conductivity, Surfaces), Solids, Heat transfer, Surface properties, Cooling.

AD-607 095 Div. 25, 4
OTS Prices: HC $3.00/MF $0.75

Unified Science Associates, Inc., Pasadena, Calif.
ELECTRON EMITTING PROPERTIES OF SMALL PARTICLES.
Final rept.,
by S. Naiditch. Oct 64, 64p
Contract AF19 628 1667, Proj. 8608, Task 860809
AFCRL 64 689

Unclassified report

Descriptors: (*Particles, Ionization potentials), (*Ionization potentials, Particle size), Aerosols, Antimony alloys, Cesium alloys, Sulfur, Aluminum, Ammonia, Scattering, Work functions, Chemical properties, Contamination.

The purpose of the program was to investigate the ionization potentials of small particles as a function of particle size. Three types of particles were prepared for various aspects of this program: (1) cesium antimonide particles grown in ammonia, (2) polydispersed aluminum particles grown in a carrier gas to minimize contamination, and (3) monodispersed sulfur particles grown in water. The objectives of producing each type of particle were to provide particles of (1) low work function, (2) high chemical purity without appreciable surface contamination, and (3) single size, respectively. In order to size particles, the technique using monochromatic X rays was tried with graphite particles. A sensitive method for the detection of heavy charged particles in a carrier gas was investigated and is being applied to the measurement of electron extraction energies of aluminum particles. (Author)

AD-607 104 Div. 25
OTS Prices: HC $3.00/MF $0.75

Syracuse Univ., N. Y. Research Inst.
ON THE QUANTUM MECHANICAL ASPECTS OF THE WAVESHAPE OF ELECTROMAGNETIC RADIATION.
Technical rept. no. 7,
by Gerard Lachs. 8 Sep 64, 58p EE494-649T7
Contract Nonr669 10

Unclassified report

Descriptors: (*Electromagnetic radiation, Quantum mechanics), (*Lasers, Quantum mechanics), (*Quantum mechanics, Electromagnetic radiation), Light signals, Noise, Communication theory, Field theory, Photons, Thermal radiation, Harmonic oscillators, Amplifiers.

Previous work of this contract on the waveshape aspects of light from a classical point of view led to an interest to investigate the quantum mechanical aspects of the waveshape of light. This work contains some results of this investigation. One of the results obtained is an upper bound on the channel capacity where the only noise in the channel is due to the zero point field. The P-representation of a general state in terms of the coherent states is utilized to obtain the probability densities of the in-phase component, quadrature component, envelope, and the number of photons of the field. This is done for thermal radiation and for radiation which is a mixture of thermal radiation and coherent radiation with the result that the thermal radiation behaves as pure Gaussian noise while the coherent radiation behaves as a classical signal. The quantum mechanical formalism is utilized to obtain the rules of superposition for a large class of fields. The results show that the signal part can be treated classically and the noise part is nearly the same as would be found from the classical superposition of noise.

AD-607 105 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Microwave Devices Lab., Univ. of Utah, Salt Lake, City.
ELECTROMECHANICAL WAVES ON ROTATING ELECTRON BEAMS.
Rept. for Jul 62-Jul 64,
by C. H. Durney and C. C. Johnson. Sep 64, 40p
MDL-ASD-1
Contract AF33 657 8677, Proj. 4156, Task 415603
AL TDR64 229

Unclassified report

Descriptors: (*Synchros, Electron beams), (*Electron beams, Polarization), (*Electrons, Motion), Mathematical analysis, Equations, Space charges, Velocity, Rotation, Propagation, Magnetic fields, Scattering, Cycloton resonance phenomena, Analysis.

A polarization-variable analysis is used to obtain the natural waves or modes on an electron beam having d-c rotation. The use of polarization variables results in both a wave solution and a physical description of electron motion. Propagation characteristics and electron beam configurations for the natural modes are given. A small-signal power theorem is used to develop the kinetic power characteristics of the natural modes. It is shown that there are fast waves which are negative power carriers. An approximate analysis of space-charge waves on a beam with d-c rotation is given. (Author)

AD-607 106 Div. 25, 4
OTS Prices: HC $2.00/MF $0.50

Polymer Research Inst., Univ. of Massachusetts, Amherst.

Mass-spectrometric analysis showed that the predominant gaseous impurities evolved from cesium samples subjected to high temperature reflux distillation in high vacuum were H2, N2, and CO. A summary of the analysis, representing results obtained from 15-gram cesium samples, is given.

AD-607 224 Div. 25, 17
OTS Prices: HC $2.00/MF $0.50

Institute for the Study of Fatigue and Reliability, Columbia Univ., New York.
ON STRAIN INCOMPATIBILITY AND GRAIN BOUNDARY DAMAGE IN FATIGUE.
Technical rept. no. 9,
by Maria Ronay. Aug 64, 43p
Contract Nonr266 91, Proj. 064 470

Unclassified report

Descriptors: (*Fatigue (Mechanics), Grain boundaries), (*Grain boundaries, Fatigue (Mechanics)), Microstructure, Brass, Copper, Deformation, Strain (Mechanics), Grain structures (Metallurgy), Fracture (Mechanics), Surface properties, Metals.

It is shown by observation of the cyclically deformed structure of Fcc metals that even under conditions of slip concentrated in bands, the restraint by neighboring grains significantly affects the damage developing in these bands. At higher strain amplitudes at which slip is not concentrated the restraint by neighboring grains produces grain-boundary damage. The concept of strain incompatibility used to interpret the observations also implies that typical surface phenomena observed in fatigue such as notches and stiles in the surface at low strain amplitudes and rumpled surfaces due to grain distortion at high strain amplitudes are mechanisms for the relief of strain incompatibilities rather than primary causes of fatigue damage, while the significance of subgrain formation with respect to fatigue changes in the course of cyclic straining. (Author)

AD-607 225 Div. 25, 17
OTS Prices: HC $2.00/MF $0.50

Institute for the Study of Fatigue and Reliability, Columbia Univ., New York.
MECHANISM OF FATIGUE DEFORMATION AT ELEVATED TEMPERATURES.
Technical rept. no. 7,
by M. Ronay, W. H. Reimann, and W. A. Wood. Jun 64, 31p
Contract Nonr266 91, Proj. 064 470

Unclassified report

Descriptors: (*Fatigue (Mechanics), High-temperature research), (*High-temperature research, Fatigue (Mechanics)), Brass, Deformation, Grain boundaries, Crystal lattice defects, Fracture (Mechanics), Surface properties, Corrosion, Microstructure, Metallography.

The basic mechanism of fatigue is studied in annealed alpha-brass subjected to alternating torsion at room temperature, 100C, 200C, 300C, and 400C and in air. It is shown that the slip-zone microcracking which characterizes fatigue damage produced by small amplitudes at room temperature is progressively replaced by grain-boundary cracking at elevated temperatures, replacement being complete at 400C. Replacement occurs not because slip activity decreases but because slip-movements at elevated temperatures cease to concentrate in narrow zones and instead disperse. Decrease of amplitude at 400C though permitting longer lives of specimens before fracture actually causes increase in grain-boundary damage, an anomaly attributed to the greater difficulty at elevated temperature of starting and propagating a crack. Surface corrosion was most pronounced along slip-bands but since at elevated temperatures the slip bands showed no cracking, the surface corrosion did not appear to influence onset and early spread of fatigue damage. (Author)

AD-607 232 Div. 25
OTS Prices: HC $1.25/MF $0.50

Battelle Memorial Inst., Columbus, Ohio.
STOPPING BY ELASTIC COLLISIONS OF PARTICLES FROM A UNIDIRECTIONAL PLANE SOURCE.
Interim technical rept.,
by E. M. Baroody. Aug 64, 51p
Contract AF33 657 8853, Proj. 7885, Task 788501
ARL 64 129

Unclassified report

Descriptors: (*Electron bombardment, Elastic scattering), (*Particle beams, Elastic scattering), Solids, Semiconductors, Isotropism, Moments, Integral transforms, Moments.

Calculations are made of certain averages for particles from a plane, unidirectional source being slowed down by elastic collisions in an infinite medium of randomly located target atoms. Calculations are based on the moments form of the Boltzmann transport equation and follow procedures frequently used in the theory of neutron moderation. Assuming isotropic scattering in center of mass coordinates, averages are determined for powers of the distance from the source and for Legendre polynomials which give information on the direction of motion. When the mean free path varies as a power of the energy a number of averages are determined at all energies for equal masses of fast particles and target atoms, and for the first collision interval for unequal masses. Expressions for spatial averages at zero energy are obtained by taking the Laplace transform of the moments equation. A few comparisons are made with moments calculated by other methods and comments are included on the place of such calculations in the theory of the stopping of kilovolt ions. An appendix reports some preliminary results for anisotropic scattering. (Author)

AD-607 242 Div. 25, 2
OTS Prices: HC $3.00/MF $0.50

Research and Advanced Development Div., Avco Corp., Wilmington, Mass.
PROPAGATION OF ACOUSTIC-GRAVITY WAVES IN A TEMPERATURE-AND WIND-STRATIFIED ATMOSPHERE.
Scientific rept. no. 2,
by Allan D. Pierce. 28 Aug 64, 54p RAD-TR-64-33
Contract AF19 628 3891, Proj. 7637, Task 763702
AFCRL 64 711

Unclassified report

Descriptors: (*Sound transmission, Atmosphere), (*Atmosphere, Acoustics), (*Acoustics, Atmosphere), Mechanical waves, Propagation, Atmospheric motion, Wind, Temperature, Perturbation theory, Integrals, Theorems, Geophysics.

A theory is presented which permits the study of the effects of horizontal winds on the dispersion and amplitudes of acoustic-gravity waves in the atmosphere. It is shown that the effective horizontal group velocity for a given frequency in a given normal mode depends on direction of propagation as well as on frequency and that it is not necessarily in the same direction as the horizontal wave number vector. A number of useful integral theorems are derived from a

Unedited rough draft trans. of Russian patent 148551, appl. no. 733451/26-10, 7 Jun 61.

Descriptors: (*Plasma physics, Instrumentation), Plasma medium, Temperature, Measurement, Incandescent lamps, Continuous spectrum, Spectroscopy, USSR.

This invention pertains to a device for measuring the temperature of plasma by the method of applying spectral lines. When this method is used to determine the temperature of plasma in the role of this device using an incandescent light creates a continuous spectrum source on the background of which is observed the individual spectral line of the investigated object. The employment of such a light, when investigating the temperature of plasma, is impossible because the brightness temperature of the source of the continuous spectrum should be no less than the brightness temperature of the investigated object (in an incandescent light this temperature does not exceed 3000). To increase the upper limit of the measured temperature, when investigating plasma, it is proposed according to the invention to use in role of continuous spectrum source a pulsed lamp with brightness smoothly changing with time. Such a lamp gives a continuous spectrum with spectral distribution close to the solar spectrum and its brightness temperature can reach 15000.

AD-607 199 Div. 25
OTS Prices: HC $3.00/MF $0.75

Stanford Research Inst., Menlo Park, Calif.
PRELIMINARY FEASIBILITY STUDY OF SUPERCONDUCTIVE NEURISTOR DEVICES.
Interim rept. no. 8,
by D. R. Chambers. Aug 64, 86p
Contract Nonr3212 00, Proj. 3286

Unclassified report

Descriptors: (*Neuristors, Superconductivity), (*Superconductivity, Neuristors), Films, Filaments, Tin, Phase studies, Propagation, Thermal conductivity, Circuits, Feasibility studies.

The aim of the work reported was to construct a physical realization of a continuously distributed neuristor, using the properties of superconducting fibers. The superconductive neuristor was developed theoretically from the electrical dual of the 'thermistor line,' following the ideas of M.W. Green. An equivalent circuit analysis, based on Green's model, was accomplished and the necessary conditions for neuristor action are defined in terms of the superconductive phenomena. An experimental study of the propagation of the normal phase along a superconductive filament required the major portion of the effort. The theory of Cherry and Gitfleman has been verified for thin film filaments, and certain pertinent extensions obtained. Investigations of the recovery processes have shown that the physical feasibility of the totally distributed neuristor depends on the thermal isolation of the active and passive parts of the structure and is not attainable; however, the operation of a semi-distributed neuristor has been demonstrated experimentally and verifies the basic concepts involved in the original model. The possible employment and subsequent impact of the semi-distributed structure on the logic-system philosophy remains to be evaluated. (Author)

AD-607 212 Div. 25, 4, 7
OTS Prices: HC $5.00/MF $1.00

United Nuclear Corp., White Plains, N. Y.
ELECTROKINETIC FLOW IN CAPILLARY ELEMENTS.
Final rept.,
by David Burgreen. Mar 63, 154p UNC-5052
Contract AF33 657 8371, Proj. 8169, Task 816904
ASD TDR63 243

Unclassified report

Descriptors: (*Electroosmosis, Capillary tubes), Electrophoresis, Fluid flow, Diffusion, Electrical double layer, Electrical properties, Power supplies, Instrumentation, Energy, Surface properties, Voltage.

The report contains a general analytical study of electrokinetic flow in channels. It includes the study of electroosmotic flow and the generation of streaming potential. The first part of the report consists of a presentation of the double layer theory and of the diffuse layer theory. An attempt was made to keep the analytical treatment explicit. Particular solutions are developed for the case of small ratios of surface ionic energy to thermal energy and for the case of large capillary radius. The report also contains an analytical study of electrokinetic flow in very fine capillaries. The results of the study suggest the possibility of the practical application of electrokinetic phenomena in pumping, power generation, and instrumentation. The last part of the report examines the efficiencies of the electrokinetic processes and discusses their application. (Author)

AD-607 217 Div. 25
OTS Prices: HC $5.00/MF $1.00

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
COMPARISON OF SHELL AND ELASTICITY THEORY SOLUTIONS FOR THICK, ORTHOTROPIC, CIRCULAR CYLINDRICAL SHELLS.
Technical rept. no. 5,
by Jacques Crouzet-Pascal and Allan Pifko. Sep 64, 155p GWT-RE-182
Contract Nonr3465 00, Proj. NR064 463

Unclassified report

Descriptors: (*Cylindrical bodies, Structural shells), (*Structural shells, Elasticity), (*Elasticity, Structural shells), Stresses, Loading (Mechanics), Thickness, Surfaces, Deformation, Sandwich construction, Structural properties, Equations.

Equations developed to describe the static response of thick, orthotropic, circular cylindrical shells to arbitrary loads are systematically applied to a number of specific problems and the results are compared to the results in the theory of elasticity. The results show that the proposed shell equations can be applied with a reasonable degree of confidence to shells with a thickness to mean radius ratio (h/a) as large as 1/5, and in some instances to thicker shells. The accuracy achieved in determining the stress and displacement of the shells at the loaded surfaces shows that the proposed shell equations are particularly well suited for interaction problems. This justifies their use for describing the structural behavior of the core of a thick sandwich shell. Finally, strong evidence for the validity of the basic assumptions of the shell theory considered are provided by the comparisons in the report.

AD-607 218 Div. 25
OTS Prices: HC $3.00/MF $0.50

National Co., Inc., Malden, Mass.
CESIUM ANALYSIS STUDY.
Technical documentary rept. for Jul 63-Apr 64,
by Thomas Athanis. Aug 64, 53p
Contract AF33 657 11749, Proj. 7360, Task 736005
ML TDR64 200

Unclassified report

Descriptors: (*Cesium, Mass spectroscopy), (*Mass spectroscopy, Cesium), Distillation, Gases, Impurities, Hydrogen, Nitrogen, Carbon compounds, Monoxides, Mass spectrum.

possibility of correlating the expected data in a new way. The results of this new correlation are dependent upon wind properties only, and are independent of flame properties. (Author)

AD-607 281 Div. 25, 20
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles.
ANNUALREPORT. 1 OCTOBER, 1963-30 SEPTEMBER, 1964 RESEARCH NOTES IN PHYSICS,
by Raymond L. Orbach and Philip Pincus. 30 Sep 64, 19p
Contract Nonr233 88, Proj. NR018 420
Unclassified report

Descriptors: (*Physics, Bibliographies), (*Nuclear physics, Bibliographies), Abstracting, Nuclear spins, Magnetic materials, Nuclear magnetic resonance, Lasers, Photons, Ions, Electrons, Antiferromagnetism, Cyclotron resonance phenomena, Aluminum, Magnetic fields, Crystallography, Paramagnetic resonance, Attenuation, Superconductors.

AD-607 287 Div. 25
OTS Prices: HC $1.00/MF $0.50

Brandeis Univ., Waltham, Mass.
CONTINUOUS REPRESENTATIONS IN THE STATISTICAL THEORY OF ELECTRONIC ENERGIES. THE SELF-CONSISTENT FIELD.
Technical rept. no. 11,
by Sidney Golden and George S. Handler. 25Sep 64, 20p
Contract Nonr1677 01, Proj. NRO51 362
Unclassified report

Prepared in cooperation with Tufts Univ., Medford, Mass.

Descriptors: (*Quantum mechanics, Statistical analysis), (*Electrons, Energy), (*Continuum mechanics, Statistical analysis), Helium, Beryllium, Neon, Density, Particles, Equations, Functions, Integrals, Theory.

A self-consistent field approximation has been applied to the continuous representation version of statistical theory. Calculations have been carried out for He (3S and 1S), Be (++)(1S), Be(1S) and Ne(1S). Binding energies are about 6% greater than experimental values. No shell structure in electron density was obtained, however, which reflects an inadequacy of the theory in approximating such properties. Nevertheless, the densities obtained gave relatively good estimates of the mean values of r to the nth power, $-2 < \text{or} = n < \text{or} = +2$. (Author)

AD-607 311 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DETERMINING THE AVERAGE SPEED AND CONCENTRATION OF PARTICLES OF A RAPID FLUX OF RAREFIED PLASMA,
by V. B. Cherenkov, O. Yu. Sevast'yanov, and Yu. M. Lukoyanov. 1 Oct 64, 13p
FTD TT64 947; TT 64 71558
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, 1964, no. 2, p. 25-29.

Descriptors: (*Plasma medium, Particles), Gas flow, Velocity, Density, Measurement, Vacuum systems, Diaphragms (Mechanics), USSR.

A method is presented for determining the average speed and concentration of the particles of a rapid flow of rarefied plasma and also the force of action of this flux on a body placed in it. The proposed method is based on the simultaneous measurement of the number of particles passing in a unit of time through a determined section and the force of action of this number of particles on a body, the coefficient of frontal resistance of which is precisely known. As such a body there is proposed the so called 'pulse trap' (F trap) which, on meeting with the particles of the flux, causes them to experience a practically absolute inelastic collision. (Author)

AD-607 313 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
A MILLION SUNS IN CRYSTAL,
by N. Yil'yin. 1 Oct 64, 10p
FTD TT64 794, TT 64 71556
Unclassified report

Unedited rough draft trans. from Sovetskii Patriot (USSR) 1963, 20 Mar, p. 3.

Descriptors: (*Lasers, Scientific research), Quantum mechanics, Electromagnetism, Oscillation, Ruby, Light, Weapons, USSR.

In recent years, in science and technology, rapic development has been achieved in quantum electronics, one of the newer branches of physics. The large scale achievements in this field have resulted in the creation of its own special type of technological miracle: quantum mechanical generators of electro-magnetic oscillations of light bands-- the lasers. A popularized description of this phenomenon is presented.

AD-607 333 Div. 25
OTS Prices: HC $2.00/MF $0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
AN EXACT CALCULATION OF MOMENTUM AND ENERGY EXCHANGE COLLISION INTEGRALS OVER DISPLACED MAXWELLIAN DISTRIBUTION FUNCTIONS.
Technical information series,
by John M. Smith. Aug 64, 37p R64SD54
Contracts AF33 657 8298, AF49 638 914
Unclassified report

Descriptors: (*Magnetohydrodynamics, Plasma medium), (*Plasma medium, Particles), Momentum, Energy, Integrals, Statistical functions, Partial differential equations, Special functions (Mathematical).

The report contains the details of the exact evaluation of the momentum and energy exchange collision integrals for particles interacting through a potential which depends upon some arbitrary power of the interparticle distance and for displaced Maxwellian distribution functions possessing different temperatures and mean velocities. A discussion of the applicability of the calculation in the framework of the solution of the Boltzmann equation is presented and the results are applied to electron conduction in the presence of strong electric fields with emphasis on electron run-away. (Author)

variational principle and one is subsequently applied to the development of a perturbation method for the computation of wind effects on dispersion. Application of the method to a realistic example indicates that winds can appreciably alter the dispersion of the normal modes and that they should be considered in any quantitative interpretation of experimental microbarograms. (Author)

AD-607 244 Div. 25, 17
OTS Prices: HC $3.00/MF $0.75

Southhampton Univ. (England).
THE OPTIMUM USE OF UNCONSTRAINED LAYER DAMPING TREATMENTS.
Rept. for Jan 61-Jan 62,
by D. J. Mead and T. G. Pearce. Aug 64, 64p
Contract AF61 052 504, Proj. 7351, Task 735106
ML TDR64 51

Unclassified report

Descriptors: (*Damping, Vibration), (*Vibration, Damping), Optimization, Deflection, Moments, Metal plates, Strain (Mechanics), Stresses, Temperature, Elasticity, Experimental data, Iterative methods.

Since unconstrained layer damping treatments on vibrating plates dissipate energy by undergoing bending strain, the treatment in the vicinity of lines of contra-flexure contributes little to the total damping. This report investigated the effect of concentrating the treatment in the regions of highest bending moment in order to use all the material more effectively. Three methods of analysis were presented, two of them being approximate but relatively rapid in use. The third has been used in extensive digital computer calculations to determine the effectiveness of given quantities of treatment, having given stiffness, when distributed over different proportions of the length of a vibrating, simply supported strip. The effectiveness has been assessed using certain criteria which apply to different problems, e.g. to the problems of reducing harmonic resonant vibration amplitudes, or inertia forces exerted by randomly vibrating panels, etc. Different criteria relate to each problem. It has been shown that very considerable increases of effectiveness are obtained by concentrating the treatment over a proportion of the length or area. For a given quantity and stiffness of treatment, the effectiveness may be maximised by covering certain optimum proportions.

AD-607 260 Div. 25, 2
OTS Prices: HC $4.00/MF $0.75

Mount Auburn Research Associates, Inc., Cambridge, Mass.
STUDY OF COUPLING OF MAGNETOHYDRODYNAMIC WAVES TO ACOUSTIC WAVES AT A PLASMA-NEUTRAL GAS BOUNDARY.
Final rept.,
by S. L. Kahalas, L. W Parker, and D. A. McNeill,
19 Aug 64, 105p
Contract AF19 628 2836, Proj. 5633, Task 563307
AFCRL 64 813

Unclassified report

Descriptors: (*Magnetohydrodynamics, Wave transmission), (*Plasma oscillations, Propagation), (*Sound, Propagation), (*Ionospheric propagation, Magnetohydrodynamics), Electromagnetic waves, Acoustics, Gases, Vector analysis, Ionospheric disturbances, Sunspots, Green's function, Integral equations, Atmosphere models.

The coupling between magnetohydrodynamic waves and acoustic and electromagnetic waves is considered at a sharp boundary between a plasma and a neutral gas, and the coupling between magnetohydrodynamic and plasma waves and acoustic waves is considered at a diffuse boundary. In the sharp boundary problem, the incident wave vector is arbitrary in direction and the magnetic field vector is considered either in the plane of incidence or perpendicular to it. The ratios of the amplitudes and energy in the transmitted waves (electromagnetic or acoustic) to the corresponding amplitudes and energy in the incident waves (fast and slow magnetoacoustic, pure Alfven mode) are determined. In the diffuse boundary problem, the coupled wave equations are presented for a partially ionized plasma of spatially varying composition, with collision terms, in the presence of a magnetic field. The coupling of longitudinal plasma waves to sound waves is considered in the absence of a magnetic field. (Author)

AD-607 262 Div. 25
OTS Prices: HC $1.00/MF $0.50

New York Univ., N. Y. School of Engineering and Science.
SOME SPECULATIONS ON ELECTROMAGNETIC THEORY,
by H. H. Chiu. 13 Jul 64, 14p NYU-AA-64-2
Grant AF AFOSR178 64

Unclassified report

Descriptors: (*Electromagnetism, Field theory), (*Field theory, Electromagnetism), (*Photons, Electromagnetism), Partial differential equations, Gases, Electromagnetic fields, Functions, Theory.

An attempt is made to derive Maxwell's equation of an Electromagnetic field, in vacuo, from the relativistic Liouville's equation for the photon gas. The density distribution of the photon gas is conceived as the scalar product of two complex vector functions. By limiting the observation to be isotropic, in a sense described by K. Kondo, it was found that half of the sum of two complex wave functions is identified as the electric field intensity, while half of the difference of the two functions, divided by square root of (-1) is the magnetic field intensity. Two vector wave functions satisfy Maxwell's equation of Electromagnetic wave in vacuo. (Author)

AD-607 279 Div. 25, 30
OTS Prices: HC $3.00/MF $0.75

National Bureau of Standards, Washington, D. C.
A LOW SPEED WIND TUNNEL FOR MEASURING THE EFFECT OF WIND ON BUOYANT DIFFUSION FLAMES.
Technical rept. no. 1,
by J. R. Welker and C. M. Sliepcevich. 25 Sep 64, 61p
Contract OCD OS62 69

Unclassified report

Prepared by Oklahoma Univ. Research Inst., Norman.

Descriptors: (*Wind tunnels, Flame propagation), (*Flame propagation, Wind tunnels), Buoyancy, Diffusion, Flames, Fires, Combustion, Liquids, Fuels, Thermodynamics, Test methods, Test facilities.

The purpose of the equipment described in this paper is to provide the environment necessary to study the behavior of flames from liquid pools under the influence of wind. The equipment includes a wind tunnel with supporting blower, appropriate calming section, and observation and control room; the burner trays; and a fuel delivery system. The design of the tunnel and equipment is based on information available in the literature. A short theoretical discussion is given and some data from the literature are used to support a slight modification of a previous method of flame representation. Literature data are also used to show the

Proj. RR002 01 41 4908
NRL 6125

Unclassified report

Descriptors: (*Plasma oscillations, Mathematical analysis), Propagation, Damping, Theorems, Vector analysis, Functions, Inequalities.

AD-607 401 Div. 25, 2, 4
OTS Prices: HC $4.00/MF $1.00

North Carolina State Coll., Raleigh. School of Physical Sciences and Applied Mathematics.
TOTAL ABSORPTANCE OF AMMONIA IN THE INFRARED.
Scientific rept. no. 1,
by Wilbur L. France and Dudley Williams. Jul 64,
130p PSR-22
Contract AF19 628 3898, Projs. 8603, 7670,
Tasks 860303, 767003
AFCRL 64 652

Unclassified report

Prepared in cooperation with Ohio State Univ., Columbus. Research Foundation, Contract AF19 604 6141.

Descriptors: (*Ammonia, Absorption spectrum), (*Infrared spectroscopy, Ammonia), Nitrogen, Chemical bonds, Band spectrum, Tables, Spectrum analyzers, Planetary atmospheres.

Apparatus and experimental techniques used in the measurement of the total absorptance of the ammonia bands near 950, 1628 and 3300/cm are described. The total absorptances of these bands at 25C were measured for pure samples of ammonia and for ammonia mixed with nitrogen. The results are displayed graphically with total absorptance shown as a function of absorber concentration and equivalent pressure, which depends upon the partial pressures of the two gases. The experimental values of partial pressure, total pressure and total absorptance are tabulated and tracings of many of the spectra are shown. Values for intensity are given for each region studied. The equivalent pressure is expressed as a function of the self-broadening coefficient, which is related by simple kinetic theory to the ratio of the optical collision diameters. These derived ratios are listed. (Author)

AD-607 405 Div. 25
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
CALCULATION OF HEATING OF BODIES UNDER THE ACTION OF RADIANT HEAT ON THE BASIS OF THE SIMILARITY THEORY,
by B. C. D'yachenko. 22 Sep 64, 14p
RSIC 275; TT 64 71575

Unclassified report

Trans. of Moskovskii Institut Inzhenerov Zheleznodorozhnogo Transporta. Trudy (USSR) 1961, v. 139, p. 105-110.

Descriptors: (*Thermal radiation, Differential equations), (*Heating, Mathematical analysis), USSR, Boundary layer, Heat transfer, Surface temperatures.

AD-607 342 Div. 25, 21
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
MAGNETOHYDRODYNAMICS,
by Milton U. Clauser. 2 Jun 58, 40p
STL/GM-TR-0127-00411
Contract AF04 647 127

Unclassified report

Descriptors: (*Magnetohydrodynamics, Reviews), Air Electrical conductance, Magnetic fields, Equations, Boundary layer, Thermonuclear reactions, Magnetic pinch, Plasma medium, Heating, Shock waves, Rocket propulsion, Nuclear propulsion.

Contents: Our half volt world; the elctrical conductivity of air; interaction of a conducting gas with a magnetic field; the basic equations; some fundamental concepts; magnetic control of the boundary layer; control of the thermonuclear reaction; the pinch effect; plasma heating; shock heating; plasma containment; application of thermonuclear reactions to rocket propulsion; fusion rocket chamber; containment power.

AD-607 377 Div. 25
OTS Prices: HC $1.00/MF $0.50

Stanford Univ., Calif. Div. of Engineering Mechanics.
ON THE SIGNS OF ONSAGER'S RECIPROCITY RELATIONS IN IRREVERSIBLE THERMODYNAMICS,
by D. H. Gage and S. J. Kline. Mar 64, 13p IT-1
Contract AF49 638 1278
AFOSR 64 1880

Unclassified report

Descriptors: (*Thermodynamics, Irreversible processes), (*Irreversible processes, Equations), Entropy, Diffusion, Matrix algebra.

The conventional presentation of Onsager's reciprocity relations specifies that the appropriate 'flows and forces' used in the rate equations for irreversible, coupled processes are obtained from an arbitrary factorization of the entropy production expression. Closer examination shows that arbitrary selection of 'flows', or dependent quantities, in the rate equations leads to an ambiguity of sign in Onsager's relations. For a system with n independent, coupled, irreversible processes, a proof is given that only two of the possible 2 to the nth power sets of rate equations obtained by arbitrarily factoring the entropy production expression completely obey L sub ij = L sub ji. The remaining 2 to the nth power - 2 possible sets of rate equations will have at least one pair of coefficients which will obey the antisymmetric relation L sub ij = - L sub ji. (Author)

AD-607 380 Div. 25, 4, 9, 10
OTS Prices: HC $4.00/MF $0.75

Space Sciences Lab., Univ. of California, Berkeley.
COMPUTATION OF GASEOUS DETONATION PARAMETERS.
Technical note no. 6,
by C. W. Busch, A. J. Laderman, and A. K. Oppenheim.
Aug 64, 109p SSL(UC)5-42, IER-64-12
Contract NAS8 2634; Grant AF AFOSR129 64
AFOSR 64 1891

Unclassified report

Prepared in cooperation with Institute of Engineering Research, Univ. of California, Berkeley.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Detonations, Gases), (*Gases, Detonations), Explosion effects, Hydrogen, Oxygen, Mixtures, Thermodynamics, Programming (Computers), Numerical methods and procedures.

This report describes the development of a method programmed for a digital computer to evaluate one-dimensional detonation parameters in gaseous media. The calculations are based on the assumptions that the mixture is comprised of ideal gas constituents and that the wave process is governed by equilibrium end conditions. Details of the analytical method of solution are presented including the IBM 7090 computer program, described in Fortran language. Sample input and output data with instructions for preparing the input data are given. Finally, computations are performed for a number of hydrogen-oxygen mixtures from H2+O2 to 3H2+O2 at several initial conditions covering a range in pressure from 0.1 to 760 mm Hg and in temperatures from -180 to +200F and a comparison is made with calculations of other investigators for a stoichiometric mixture initially at NTP. (Author)

AD-607 386 Div. 25
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
THE ENERGY ELECTRON IN A GAS IN AN ARBITRARY ELECTRIC FIELD I,
by Paul Molmud. 22 Mar 56, 9p

Unclassified report

Descriptors: (*Transport properties, Electrons), (*Electrons, Energy), (*Gases, Electric fields), Kinetic theory, Integral equations, Statistical functions, Theory.

The average energy of electrons in a gas in an arbitrary electric field is determined from the time dependent Boltzman transport equation. The assumptions are: collision frequencies are dependent of energy and there are only elastic collisions. The solution is obtained for the case of a sinusoidally varying field and contrasted with a solution obtained on a more elementary level. (Author)

AD-607 392 Div. 25, 9
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMMENTS ON SOME EXPLICIT SOLUTIONS FOR CONSTANT-TEMPERATURE MAGNETO-GASDYNAMIC CHANNEL FLOW.
by Mary F. Romig. Aug 62, 6p P-2637

Unclassified report

Prepared for publication in the Journal of the Aero/Space Sciences.

Descriptors: (*Magnetohydrodynamics, Gas flow), (*Gas flow, Magnetohydrodynamics), One-dimensional flow, Partial differential equations, Equations, Electric fields, Magnetic fields, Temperature, Theory.

AD-607 397 Div. 25
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
RIGOROUS TREATMENT OF THE PROPAGATION AND DAMPING OF SMALL-AMPLITUDE PLASMA WAVES IN AN INITIALLY MAXWELLIAN PLASMA.
Final rept.,
by A. W. Sáenz. 28 Aug 64, 26p

of stopping environment the essence of the decision process is that it eventually terminates. Examples of such processes include house-searching, mate selection, and many kinds of investment decisions.

AD-607 045 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
THE WELDING AND BRAZING OF ALLOY 718,
by R. M. Evans. 1 Jun 64, 25p DMIC-204
Contract AF33 615 1121, Proj. 8975
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Nickel alloys, Thermal joining), (*Welding, Nickel alloys), (*Brazing, Nickel alloys), Tensile properties, Mechanical properties, Aluminum alloys, Titanium alloys, Niobium alloys.

Because of a special interest in Alloy 718, the Defense Metals Information Center has summarized information on the welding and brazing of the alloy. Two principal resons for the interest in this alloy are its good formability and its good weldability, expecially under restraint. The greater portion of the fusion welding of Alloy 718 has been done by the gas tungsten-arc (TIG) process. A discussion of welding atmosphere, filler metals, heat treatment of welds, welding under restraint, and weld toughness is presented in the section on fusion welding. Information is also presented on resistance welding and electron-beam welding of Alloy 718. The final section of this report deals with the brazing of Alloy 718.

AD-607 072 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
POROSITY IN TITANIUM WELDS,
by Robert M. Evans. 8 Jun 64, 15p DMIC-M-194
Contract AF33 615 1121, Proj. 8975
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Welds, Porosity), (*Welding, Titanium alloys), (*Titanium alloys, Welds), Hydrogen, Cleaning, Welding rods, Contamination, Gases.

Porosity in fusion welds in titanium has been encountered to some extent in all programs using this joining method. While measures to control cleanliness and to employ good welding techniques have successfully reduced the occurrence of porosity, specific indentification of the various causes of porosity is still lacking. Some factors suspected of causing porosity in titanium welds are hydrogen, cleanliness of joint area, contamination in filler wire, and welding procedures and techniques.

AD-607 102 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Astronuclear Lab., Westinghouse Electric Corp., Pittsburgh, Pa.
PILOT PRODUCTION AND EVALUATION OF TANTALUM ALLOY SHEET.
Quarterly rept. no. 8, 28 Apr-28 Jul 64,
by R. L. Ammon and R. T. Begley. 1 Sep 64, 21p
WANL-PR-M-010
Contract NOw64 0394d
Unclassified report

Descriptors: (*Tantalum alloys, Rolling (Metallurgy)), (*Rolling (Metallurgy), Tantalum alloys), Heat treatment, Sheets, Tensile properties, Temperature, Castings, Hardness, Ductility, Cold working, Grain structures (Metallurgy), Recrystallization.

This quarterly report describes the investigation of the processing procedures used to convert T-222 from arc cast ingot to sheet. The effects prior reduction, the number and temperature of intermediate anneals, and the temperature of the final anneal were evaluated with respect to 2400F tensile properties. Preliminary results indicated that intermediate and final annealing temperature had a significant effect on tensile properties. (Author)

AD-607 113 Div. 26, 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STARTING CONDITIONS ON PLAIN THRUST BEARINGS,
by M. E. Podol'skii. 30 Sep 64, 13p
FTD TT64 509; TT 64 71521
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, 1963, no. 1, p. 197-200.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Thrust bearings, Lubrication), (*Lubrication, Thrust bearings), Starting, Floating bodies, Float, Differential equations, Fluid dynamic properties, Friction, USSR.

The hydrodynamics of an oil film has been considered and the basic principles of operation of plain bearings at start-up have been established previously 1 . The solution to the problem was carried out on the assumption that in the case of bearings with self-adjusting pads the ratio of the layer thickness at the gap inlet and outlet of oil is independent of time. This article deals with the problem to a more complete extent without introducing additional limitations imposed on the rotation of the pad. (Author)

AD-607 119 Div. 26, 9, 14
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE PROBLEM OF LUBRICATING JOURNAL BEARINGS WITH AN AXISYMMETRIC SUPPORTING SURFACE,
by I. Ya. Tokar and P. S. Chernyakov. 21 Sep 64, 14p
FTD TT64 510; TT 64 71533
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, 1963, no. 2, p. 149-152.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Journal bearings, Lubrication), (*Lubrication, Journal bearings), Conical bodies, Axially symmetric flow, Incompressible flow, Mathematical analysis, Partial differential equations, Bearings, Lubricants, Friction, USSR.

26. Production and Management

AD-606 872 Div. 26, 15, 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
STATISTICAL APPROACH TO SIMULATION,
by Murray A. Geisler. Feb 62, 24p P-2543
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Inventory control, Simulation), (*Simulation, Statistical analysis), Costs, Analysis, Programming (Computers), Mathematical models, Stochastic processes, Optimization.

AD-606 877 Div. 26, 17, 27
OTS Prices: HC $4.00/MF $0.75

Arde-Portland, Inc., Paramus, N. J.
DEVELOPMENT OF HIGH STRENGTH ALLOYS BY CRYOGENIC STRETCH-FORMING.
Final rept. Part I,
by R. H. Alper. 17 Sep 64, 110p
Contract NOw63 0387C
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Stainless steel, Stretch forming), (*Stretch forming, Cryogenics), (*Cryogenics, Stretch forming), Chromium alloys, Nickel alloys, Molybdenum alloys, Tensile properties, Aging (Materials), Niobium alloys, Aluminum alloys, Melting, Vacuum apparatus, Austenite, Cold working, Rocket cases, Pressure vessels, Martensite, Strain (Mechanics), Welds, Brittleness.

The basis for the work conducted is the property of austenitic stainless steels to strengthen by transforming to a low carbon martensite when subjected to cold work at cryogenic temperatures. In addition, an ageing treatment at 800F after cryogenic cold working results in a further increase in strength. A series of experimental heats were prepared and evaluated for their response to stretching at -320F as well as subsequent ageing at 800F. It was demonstrated that the highest strength levels could be achieved when the 301 was alloyed with hardener elements. For example, with alloys containing Cb and Al, uniaxial strength levels of 350,000 psi were obtained.

AD-606 917 Div. 26, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MANUFACTURERS' INVENTORY CYCLES AND MONETARY POLICY,
by D. M. Eisemann. 9 May 58, 20p P-1370
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Inventory control, Money), (*Commerce, Inventory control), Industrial production, Inventory, Inventory analysis, Costs, Distribution (Economics), Management engineering, Budgets.

The availability of credit is one of the factors which many businessmen must take into account when planning their inventory policy. When inventories are rising rapidly, firms become increasingly dependent on bank credit, and a change in credit policy may have an important influence on inventory fluctuations. This study attempts to measure the impact monetary policy might have on inventories, and to examine the limitations such a policy might face. (Author)

AD-606 956 Div. 26, 28
OTS Prices: HC $2.00/MF $0.50

Carnegie Inst. of Tech., Pittsburgh, Pa.
Graduate School of Industrial Administration.
A FIELD STUDY OF AUDITING AS A MECHANISM FOR ORGANIZATIONAL CONTROL,
by Neil Chruchill and William W. Cooper. Jun 64,
38p ONR-RM-126
Contract Nonr27T024
Unclassified report

Descriptors: (*Management engineering, Industrial psychology), (*Industrial psychology, Management engineering), Control systems, Personnel, Attitudes, Performance (Human), Education, Behavior, Perception (Psychology), Public opinion, Operations research.

This paper reports on one of a series of studies directed toward control (as distinguished from planning) in management. One aspect of the total study series is concerned with audits, auditing, and auditors as vehicles for influencing the activities of managers. The present paper is concerned with a field inquiry directed to ascertaining some of the perceptions which persons report who have been subjected to one or more phases of an audit process. The need for such a field study was pointed up by experiments which were to be conducted to ascertain ways in which an audit might effect the performance of laboratory subjects. Important parts of the design for this experiment were contingent upon ways in which subjects might perceive any audit to which they were exposed. Thus a precise structuring of the audit variable was necessary. Recourse to the literature of accounting and psychology produced only vague or tangential suggestions, apparently because no previous studies had been directed to this particular topic.

AD-606 968 Div. 26, 28, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE ECONOMICS OF INFORMATION AND OPTIMAL STOPPING RULES,
by John J. McCall. Oct 64, 38p P-2987
Unclassified report

Descriptors: (*Management control systems, Decision theory), (*Dynamic programming, Decision theory), (*Economics, Decision making), Game theory, Operations research, Optimization, Maintenance, Scheduling, Statistical analysis, Probability, Stochastic processes.

In this paper, two different stopping environments were analyzed. The decision process occurring in the first environment is continuous and repetitive like inventory management, process control, and maintenance management. However, the probability mechanism associated with the repetitive process is not known. Frequently, the decision-maker has the option of accumulating information about the probability law. The problem is when to stop collecting information. Statistical decision theory was used to solve this class of problems. In the second type

AD-607 337 Div. 26, 30
OTS Prices: HC $3.00/MF $0.75

Thompson Ramo-Wooldridge, Inc., Los Angeles, Calif.
OPERATIONS RESEARCH AND THE ACCOUNTANT,
by Andrew Vazsonyi. 1956 91p

Unclassified report

Address presented to the San Francisco Chapter of the National Association of Cost Accountants, 26 Jun 56, San Francisco, Calif.

Descriptors: (*Operations research, Management engineering), (*Management engineering, Mathematics), Costs, Commerce, Labor, Industries, Equations, Scientific personnel.

There has been a certain amount of scepticism and even apprehension on the part of accountants with respect to the sudden appearance of scientists in the affairs of the business world. A particularly perplexing feature of operations research is the use of mathematical language, even when dealing with conventional problems. This paper explains in layman's language, why scientists use mathematics both in the physical sciences and in the problems of the business world. The businessman of the future need not become a mathematician, as mathematics in business may be considered as a highly sharpened form of common sense. As an illustration of the use of mathematics, a cost accounting problem is discussed and it is shown that a statistical definition of 'overhead' can lead to simplified pricing methods and management controls. Also, some of the confusing aspects of 'overhead' accounting can be avoided by using mathematical techniques. (Author)

AD-607 369 Div. 26, 17, 27
OTS Prices: HC $5.00/MF $1.00

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
PRECISION FORGING PROGRAM FOR TURBINE WHEELS AND GEARS.
Final technical documentary rept. for 20 Jun 62-12 May 64,
by Tobert W. Redlinger and James A. Timura.
Oct 64, 173p
Contract AF33 657 8791, Proj. 7 930
ML TDR64 283

Unclassified report

Descriptors: (*Forging, Turbine parts), (*Turbine wheels, Forging), (*Gears, Forging), Extrusion, Machining, Casting, Dies, Cermets, Plastics, Ceramic materials, Powder alloys, Forge presses, Surface properties, Metallography, Tensile properties, Stresses, Rupture, Turbine blades, Heat-resistant alloys, Precision finishing.

The radial extrusion process has been developed and demonstrated to be feasible as a method for precision forging gears and turbine wheels with integral blades. A state-of-the-art survey indicated a need for an improved forming process to rapidly and economically fabricate the high temperature metals and superalloys into advanced aircraft and aerospace components. The development program initiated to fulfill these objectives included a single station screening phase to develop the process components and a full scale effort to fabricate and evaluate turbine wheels and gears. Results of the screening tests used to evaluate expendable materials for forging die inserts showed a high density alumina product to be most promising. Precision cast steel inserts performed satisfactorily as permanent type inserts. The success of using individual die inserts in a precision forging operation depended on a unique hydraulic closure mechanism which adapted the forging tooling in an 8000-ton mechanical press. The developed process was used to produce high quality turbine wheels with integral blades from several superalloys. Precision tolerances, excellent surface finish, and minimum stock removal were obtained by forging the material into individual die cavities having zero draft on the sides. The process was verified by the satisfactory metallurgical and mechanical properties obtained from the forgings produced during a prototype production run. (Author)

AD-607 390 Div. 26, 17
OTS Prices: HC $2.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
PRINCIPLES OF MAGNETOHEAT TREATMENT OF STEEL,
by Roman Skorski. 22 Sep 64, 39p
RSIC 279; TT 64 71576

Unclassified report

Trans. of Instytut Mechaniki Precyzyjnej. Prace (Poland) 1961, v. 9, no. 34, p. 37-50.

Descriptors: (*Steel, Heat treatment), (*Heat treatment, Magnetic fields), Iron, Magnetostriction, Grain structures (Metallurgy), Magnetic properties, Surface tension, Mechanical properties.

Survey of literature dealing with research into magnetoheat treatment of steel; Mechano-electro-magnetic effects and their role in magneto-heat treatment; Explanation of the composite M. S. pulses in iron in terms of magnetostriction consisting of two components: positive and negative; Fine grain formation in steel annealed in a magnetic field due to increased surface tension caused by this field; Explanation of the mechanical properties of iron annealed in a magnetic field with the aid of the hypothesis of disc-shaped iron atoms; The existence is shown of the tetragonal allotropic form of iron. (Author)

AD-607 394 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
ABOUT THE STRESS DISTRIBUTION IN ELECTRIC RESISTANCE WELDING JOINTS IN THIN SHEET METALS,
by Franz Bollenrath. 7 Oct 64, 16p
RSIC 297; TT 64 71578

Unclassified report

Trans. of Deutsche Versuchsanstalt fur Luftfahrt, e.V. Jahrbuch (Germany) 1937, Jan, p. 303-307.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Welds, Stresses), (*Sheets, Welds), Welding, Resistance (Electrical), Metals, Fatigue (Mechanics), Rupture, Photoelasticity.

On three models made from Trolon the edge stresses are determined by means of the photoelastic method for simplified conditions of resistance-welded joints of overlapped sheet metals of equal thickness. The stress maxima have been found at the edge of the seam; they are 5.43 times the mean stress in the metal for the single single-shear joint and 1.75 times for the single double-shear joint and 4.3 times for the single-shear double joint. Fatigue ruptures of spot-welded joints start from positions where according to stress measurements the greatest pulling stresses occur. (Author)

AD-607 305 Div. 26
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
HEAVY DUTY HYDRAULIC FORGING PRESS WITH FRAME BED PLATE, CONSISTING OF INDIVIDUAL PLATES,
by A. S. Andreev and M. L. Bekker. 25 Sep 64, 10p
FTD TT64 931; TT 64 71563
Unclassified report

Unedited rough draft trans. of Russian patent 129 486, appl. no. 635809/25, 6 Aug 59.

Descriptors: (*Forge presses, Hydraulic presses), (*Hydraulic presses, Forge presses), Design, Structural parts, Metal plates, Wedges, Cylindrical bodies.

Two rollers and two sets of cylindrical wedges are used for the fastening of plates in the corners of the frame bed plate, forming together a prestressed angular connection, to prevent displacement of plates relative to each other during the operation of the press. A hydraulic support is used as a foundation of the center frame of the bed plate. (Author)

AD-607 306 Div. 26, 1
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PLANETARY GEARS: SELECTED PARTS,
by Wiktor Surowiak. 2 Oct 64, 29p
FTD TT64 654; TT 64 71562
Unclassified report

Unedited rough draft trans. of mono. Przekladnie Obiegowe (Planetarne) Warsaw, 1959, p. 6-7, 34-45, 456-466.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aircraft, Reduction gears), (*Reduction gears, Classification), Configuration, Design, Helicopter rotors, Helicopters, Poland, Drives.

Contents: Planetary gears, list of most important designations; Classification and planetary gear designations; Application in the construction of aircraft helicopters.

AD-607 310 Div. 26
OTS Prices: HC $5.00/MF $1.25

IIT Research Inst., Chicago, Ill.
DEVELOPMENT OF 2400F FORGING DIE SYSTEM.
Final technical documentary rept,
by T. Watmough and Paul R. Gouwens. Jul 64, 193p
IITRI-B220-32
Contract AF33 600 42861, Proj. 7 886
ML TDR64 228
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best abailable copy.

Descriptors: (*Forging, Dies), (*Dies, Forging), (*Heat-resistant materials, Dies), Nickel alloys, Molybdenum alloys, Chromium alloys, Aluminum alloys, Niobium alloys, Titanium alloys, Costings, Temperature, Heat-resistant metals and alloys, Refractory materials, Ceramic materials, Composite materials, Tungsten alloys, Zirconium alloys, Refractory coatings, Oxidation, Tantalum alloys, Hafnium alloys, Compressive properties, Hot working.

The technology of using high-temperature dies for closed die forging was further advanced by a program having three broad objectives: (1) extended the die temperature beyond the 1600F previously achieved, and determine the upper temperature limit of Inconel 713C for forging steel; (2) evaluate the possibility of using the high-temperature die system to reduce the number of forging sequences required to form a part; and (3) develop materials and techniques for raising the die temperature to 2400F and use such a system for forging a molybdenum alloy. (Author)

AD-607 312 Div. 26
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTRONICS' NEW RIVAL,
by I. Makarov and A. Dubov. 25 Sep 64, 10p
FTD TT64 762; TT 64 71557
Unclassified report

Unedited rough draft trans. from Izvestiya (USSR) 1964, 4 Feb, p.5.

Descriptors: (*Pneumatic systems, Automation), Pneumatic devices, Plastics, Metals, Industrial equipment, USSR.

A report on new developments in the field of pneumatics is presented. A discussion on the economics of automated pneumatic systems in industrial plants is given. The development of a system of standard pneumatic devices and parts in the USSR industry is also discussed.

AD-607 326 Div. 26, 30, 32
OTS Prices: HC $1.00/MF $0.50

California Univ., Berkeley. Center for Research in Management Science.
ANNUAL REPORT. MANAGEMENT SCIENCE.
NOTES ON OPTIMIZATION AND DECISION PROBLEMS .
1964, 3p
Contract Nonr222 77, Proj. NR047 029
Unclassified report

Descriptors: (*Dynamic programming, Management engineering), Transformations (Mathematics), Programming (Computers), Distribution (Economics), Economics, Iterative methods, Numerical analysis, Inequalities, Equations, Functions, Bibliographies, Optimization, Decision theory.

A class of problems of optimal resource allocation over time was studied using the techniques of dynamic programming. Sufficient conditions were found for the state valuation function to be the unique solution of the usual functional equation of dynamic programming. Exact solutions were found for the case of linear-logarithmic production and criterion functions. This exact solution was used to form the basis of an algorithm designed to handle any problem in which the production functions are differentiable and the criterion function is differentiable, and separable in time. Numerical computations were performed to compare two algorithms for the solution of systems of linear inequalities, the standard 'artificial variables' method, and the new 'characteristic function' method of Debreu.

Descriptors: (*Drawing (Machine processing), Rocket cases) (*Rocket cases, Manufacturing methods), (*Rocket motors (Solid propellant), Rocket cases), Tools, Dies, Steel, Nickel alloys, Cobalt alloys, Molybdenum alloys, Grain structures (Metallurgy), Heat treatment, Tests, Hydrostatics, Metal forming presses, Maraging steels, Machining.

The general objective of this contract is to utilize the hot cup-cold deep draw fabrication method to develop improved monolithic rocket motor cases for 40" (and over) diameter solid propellant rockets. The specifice goals are: 1. The development of reliable motor cases with hoop stress limits substantially in excess of 200, 000 PSI steel equivalent. 2. A capability of fabrication with reasonable ease on an industrial scale. 3. A producibility proven by reliability tests at final full scale. 4. The objective is to be accomplished utilizing the Pershing 2nd stage motor case configuration.

AD-607 341 Div. 27, 10
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.

EXPERIMENTAL INVESTIGATION OF SLOSHING.
Semi-annual rept. for 1 Jan-30 Jun 59,
by J. P. O'Neill. 30 Jun 59, 36p
STL/TR-59-0000-00713
Contract AF04 647 309

Unclassified report

Descriptors: (*Propellant tanks, Sloshing), (*Sloshing, Damping), Guided missiles, Configuration, Mechanical waves, Nonlinear systems, Measurement, Rings, Hemispherical shells.

Experimental techniques were developed for measuring slosh damping in a variety of tank and baffle configurations. The various methods were compared and shown to be in satisfactory agreement. The Able-Star damping investigation made use of one of the methods having the broadest application possibilities. A systematic variation of tank-shape parameters is continuing in support of ballistic missile programs like ATLAS, TITAN, and THOR, and in preparation for the needs of future space explorations systems. Nonlinear damping effects were investigated. Waves sweeping across a domed tank bottom resulted in plunging flow with high but erratic damping. Waves splashing against damping rings were quickly damped, but a new slosh mode persisted with low damping. (Author)

27. Propulsion Systems

AD-607 110 Div. 27, 9
OTS Prices: HC $3.00/MF $0.75

Space Technology Labs., Inc., Los Angeles, Calif.
INVESTIGATION OF NONEQUILIBRIUM PHENOMENA IN ROCKET NOZZLES.
Semiannual rept. for 1 Jul-31 Dec 58,
by J. G. Logan. 31 Dec 58, 86p
STL/GM-TR-0165-00581
Contract AF04 647 165

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Rocket motor nozzles, Thermodynamics), (*Reaction kinetics, Exhaust gases), (*Exhaust gases, Reaction kinetics), Shock tubes, Laboratory equipment, Hydrazine, Fluorine, Liquid rocket propellants, Design, Thermodynamic properties, Recombination reactions, Emissivity, High-temperature research, Solid rocket propellants, Gases, Absorption, Spectroscopy, Thermodynamics, Gas flow, Equilibrium flow.

Progress in the program for the Investigation of Non-equilibrium Phenomena in Rocket Nozzles for the period 1 July to 31 December 1958 is described. Theoretical calculations were carried out for the hydrazine-fluorine propellant system to obtain design data for the kinetics shock tube facility. These studies include calculation of thermodynamic properties for hydrazine-fluorine systems and shock calculations. (Author)

AD-607 169 Div. 27, 1, 9, 25
OTS Prices: HC $7.45/MF $2.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
RAMJET ENGINES,
by M. N. Bondaryuk and S. M. [illegible]shenko. Feb 60, 448p
FTD F TS 9740 V; TT 60 19107

Unclassified report

Trans. of mono. Pryamotochnye Vozdushno-Reaktivnye Dvigateli, Moscow, 1958, 393p.

Descriptors: (*Ramjet engines, Handbooks), (*Aircraft engines, Ramjet engines), Jet propulsion, Theory, Construction, Design, Operation, Jet engines, Aerodynamic characteristics, Gas flow, Thermodynamics, Diffusers, Exhaust nozzles, Jet engine fuels, Combustion, Combustion chambers, Atomization, Subsonic characteristics, Supersonic characteristics, Nuclear propulsion, USSR.

In this book the information on the theory, characteristics, construction, and design of subsonic and supersonic ramjet engines is based on domestic and foreign materials which have been published in the form of books and magazine articles. The theory of the basic elements of the engine -- diffusers, combustion chambers, and jet nozzles -- is considered, as well as the operation of the entire engine. Molecular and even atomic fuels are regarded as sources of energy. This book is intended for engineers who are specialists in aircraft engine construction, and for students in higher educational aviation institutions who are familiar with the fundamentals of thermodynamics and gas dynamics. (Author)

AD-607 308 Div. 27, 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TWIST OF FLOW AND ITS EFFECT ON THE EFFECTIVENESS OF A CURVILINEAR DIFFUSER,
by V. N. Amelyushkin and M.P. Umanskii. 18ep 64, 14p
FTD TT64 551; TT 64 71560

Unclassified report

Unedited rough draft trans. of Energomashinostroenie (USSR) 1963 (v.9) no. 12, p. 18-21.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Diffusers, Fluid dynamic properties), (*Fluid mechanics, Diffusers), Exhaust diffusers, Exhaust nozzles, Jet engines, Fluid flow, Experimental data, Graphics, USSR.

The effect of flow twist on the effectiveness of a curvilinear diffuser with rigidity ribs and without them is investigated.

AD-607 322 Div. 27, 4, 9, 10, 25
OTS Prices: HC $3.00/MF $0.75

Virginia Univ., Charlottesville.
SEMI-ANNUAL PROGRESS REPORT, 1 APRIL 1964-30 SEPTEMBER 1964.
1 Oct 64, 82p
Contract Nonr3623 00, Proj. NR098 038

Unclassified report

Rept. on Proj. SQUID.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
It apperars that some pages were intentionally left blank.

Descriptors: (*Ramjet engines, Scientific research), (*Fluid mechanics, Reports), (*Reaction kinetics, Reports), (*Combustion, Reports), Nonequilibrium flow, Turbulence, Shock waves, Thermodynamics, Transport properties, Plasma physics, Magnetohydrodynamics, Gas ionization, Chemical reactions, Atomic energy levels, Free radicals, Propellants, Flame propagation.

Contents: Fundamental investigation of nonsteady and nonequilibrium flow; Investigation of turbulence; Shock wave separation in gas mixtures; Fundamental study of dynamics of gases and plasmas; Research on thermodynamic and transport properties of gases at high temperatures and pressures; Properties of two-phase Flow - Electric phenomena; Magnetohydrodynamics of partially ionized gases; Chemi-ionization; Theory of fast reactions; Investigation of reaction kinetics in high-temperature gases; Reactions of ions and electronically excited species with atoms and molecules in the gas phase; chemical kinetics and gas dynamics of atom and free-radical reactions; Inelastic molecular collisions; Solid-propellant flame mechanisms.

AD-607 324 Div. 27, 17, 26
OTS Prices: HC $3.00/MF $0.75

Lyon, Inc., Detroit, Mich.
DEVELOPMENT OF DEEP DRAWN, ONE-PIECE HIGH PERFORMANCE ROCKET MOTOR CASE.
General rept. no. 23 (Final), 1 Jan-Sep 63,
by Wayne A. Martin. 1 Sep 64, 62p
Contract DA20 018ORD23004

Unclassified report

engineering), (*Indexes, Electronic equipment), Instruction manuals, Operators (Personnel), Reliability, Time, Performance (Human), Operation, Data.

This manual is intended to provide guidance for evaluators in applying the Index of Electronic Equipment Operability. In addition to this manual, application of the Index requires a Data Store booklet and an Evaluation Booklet. The Data Store provides quantitative standards for estimating human reliability and speed of performance for various types of operations. The Evaluation Booklet contains a standard format for recording the results of an evaluation. Background information concerning the Index and a description of its development are presented in the technical report, Development of an Index of Electronic Equipment Operability. This instruction manual is divided into three major sections. The first section provides a general description of the Index and its purpose. The second section contains detailed instructions for applying the Index. Explicit instructions are provided for the data collection, scoring, and summarizing steps in the evaluation. General guidance is offered for the judgmental processes of interpreting the results of the evaluation and deriving design and other recommendations. The third and final section of the manual is the Appendix, which contains samples of the various forms used in the application of the Index. (Author)

AD-607 197 Div. 28
OTS Prices: HC $1.00/MF $0.50

Miami Univ., Coral Gables, Fla.
CONFORMING BEHAVIOR AS A FUNCTION OF THE INTERACTION OF SITUATIONAL VARIABLES AND NEEDS FOR AFFILITATION AND ACHIEVEMENT.
Technical rept. no. 6,
by Frank Sistrunk and John W. McDavid. Aug 64, 21p
Contract Nonr840 22, Proj. NR177 303
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Behavior, Motivation), (*Group dynamics, Behavior), Performance tests, Stress (Psychology), Word association, Social psychology, Students, Analysis of variance.

In order to explore the interactive effects of several variables which have been demostrated, in isolation, to govern the occurrence of conforming behavior, a complex multivariate study was executed. Variables investigated included three situational factors (ambiguity of the judgmental task, goal-orientation of the subject in performing the task, and prestige of the source of social influence pressures) and one motivational factor (relative dominance of achievement or affiliation motivation as measured by the EPPS). Subjects were 1 2 university students, and social pressures were applied to judgments of word synonyms in a paper-and-pencil task. Greater susceptibility to pressures to conform occurred regardless of other conditions (a) on difficult or ambiguous tasks as compared to easy unambiguous tasks and (b) when subjects were informed that the task was a potential assessment of intellectual ability than when they were told that it was an investigation of conventionality in word associations.

AD-607 198 Div. 28
OTS Prices: HC $2.00/MF $0.50

Miami Univ., Coral Gables, Fla.
INTERACTIONS OF SITUATIONAL AND MOTIVATIONAL VARIABLES IN THE GENERATION OF NORMATIVE AND INFORMATIONAL SOCIAL INFLUENCE.
Technical rept. no. 7,
by Frank Sistrunk and John W. McDavid. Aug 64, 35p
Contract Nonr840 22, Proj. NR177 303
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Behavior, Motivation), (*Group dynamics, Behavior), Social psychology, Personality, Performance tests, Stress (Psychology), Word association, Students, Analysis of variance.

In a complex multivariate study designed to explore the interactive effects of frequently demonstrated determinants of conforming behavior, both predispositional personality factors and situational conditional factors were investigated within a common framework. Two predispositional factors (tendencies to respond to potential social influencers as sources of information, and as generators of norms for conventional or acceptable behavior) and four situational factors (task ambiguity, prestige of the influencer, goal-set in executing the task, and degree of commitment to discuss and defend expressed judgments) were investigated. Observations of conforming behavior of 160 college students under various combinations of these conditions were made in contrived groups exposed to influence on their judgments of word synonyms in a paper-and-pencil test. The greatest significance of the investigation lies in the demonstration of considerable mutual interdependence among the factors investigated. A secondary contribution is derived from findings which suggest the nature of particular conditions under which particular variables (especially personality factors) operate differentially in governing the occurrence of conformity. Finally, there are several implications which support the differentiation of multiple motivational bases underlying the occurrence of overt conforming responses. (Author)

AD-607 243 Div. 28
OTS Prices: HC $2.00/MF $0.50

Educational Testing Service, Princeton, N. J.
SOME EFFECTS OF COMMUNICATION RESTRAINTS ON PROBLEM-SOLVING BEHAVIOR.
Technical rept. and Research bulletin,
by Carolyn B. McConville and John K. Hemphill.
Sep 64, 36p RB-64-44
Contract Nonr2959 00
Unclassified report

Descriptors: (*Group dynamics, Social communication), (*Social communication, Performance (Human)), Behavior, Social psychology, Psychometrics, Students, Females.

The present experiment tests the hypothesis that communication facilitates the development of structure-in-interaction and thus contributes to the effectiveness of the group's problem-solving activities. The subjects, 120 women, most of whom were college graduates and ranged in age from 20 to 60 years, were divided into 30 groups of four members each. One-third were designated as Free Communication groups, another third as Limited Communication groups, and the final third as No Communication groups. The task for all groups was identical: to light a goal square in a 5 x 5 electrical plugboard in a minimum number of moves. Rules defining permissible moves were imposed to create a mutual task. The Free Communication groups were permitted to send a written message to any (all) of their partners between trials; the Limited Communication groups were required to send a message to each of their partners between trials; the No Communication groups were required to send a message to the experimenter at the end of each trial. Measures relating to task effective-

28. Psychology and Human Engineering

AD-606 974 Div. 28
OTS Prices: HC $1.00/MF $0.50

Pennsylvania State Univ., University Park.
FORM-CLASS AS THE BASIS FOR CLUSTERING IN THE RECALL OF NON-ASSOCIATED WORDS.
Technical rept. no. 2,
by Charles N. Cofer and Darryl R. Bruce. Jun 64, 12p
Contract Nonr656 30

Unclassified report

Rept. on Learning, Retention, and Recovery of Meaningful Materials.

Descriptors: (*Word association, Recall), (*Recall, Word association), Learning, Retention, Psychometrics, Correlation techniques.

Two 36-item lists composed of 12 adjectives, 12 nouns, and 12 verbs were presented either in random orders or by means of block presentation over 4 trials to determine whether form-class membership would constitute a basis for clustering. The individual words were not associated with one another. Under random presentation, no clustering was found, and, under block presentation clustering occurred in minimal amounts. Evidence was presented to indicate that Ss did not perceive or use form-class as a basis of organization, although classifications of the words according to form-class by comparable Ss were accurate. Whether unassociated but categorized words will cluster on the basis of their categories cannot be decided definitively from this experiment, but evidence is brought together which is suggestive of the notion that category relations may be ineffective as a basis for clustering in the absence of inter-item associations. (Author)

AD-606 975 Div. 28
OTS Prices: HC $2.00/MF $0.50

Pennsylvania State Univ., University Park.
CLUSTERING IN FREE RECALL AS A FUNCTION OF CERTAIN METHODOLOGICAL VARIATIONS.
Technical rept. no. 3,
by Charles N. Cofer, Darryl R. Bruce, and Gerald M. Reicher. Sep 64, 26p
Contract Nonr656 30

Unclassified report

Rept. on Learning, Retention, and Recovery of Meaningful Materials. Prepared in cooperation with Michigan Univ., Ann Arbor.

Descriptors: (*Word association, Recall), (*Recall, Word association), Learning, Retention, Psychometrics, Correlation techniques.

Three experiments involving category clustering in lists composed of high-frequency (HF) and low-frequency (LF) associates of the category names are reported. The major results were: 1. Block presentation augments clustering in both lists and augments word recall in HF but not in LF lists. 2. Word recall and clustering are higher in HF lists than in LF lists. 3. Duration of item presentation interval augments both clustering and word recall within limits. 4. An immediate recall augments or maintains clustering and word recall on a second recall, obtained after a short delay. 5. These findings and certain interactions are discussed with respect to the interpretation of recall of categorized lists. It is concluded that a coding hypothesis cannot do justice to all the findings. Associations between the category names and their instances or among the instances themselves are suggested as supplemental or alternative mechanisms. (Author)

AD-607 051 Div. 28
OTS Prices: HC $4.00/MF $1.00

ITT Federal Labs., Nutley, N. J.
STUDY OF RESPONSE ECONOMY IN HUMAN OPERANT BEHAVIOR.
Final rept.
1964, 128p ITT-TD 64-270
Contract Nonr2973 00

Unclassified report

Descriptors: (*Behavior, Conditioned reflex), (*Conditioned reflex, Behavior), Performance tests, Reaction (Psychology), Reflexes, Performance (Human), Equations, Psychometrics.

These studies show that the key-pressing behavior of human subjects in a free-responding situation is strongly and systematically influenced by the time integral of response force exerted on the key. Emission of the supra-threshold as well as rate of responding is affected. Sensitivity to other aspects of the experimental situation, such as the schedule of reinforcement, may be enhanced by increasing the threshold above a minimal level. There is a tendency, observed in several phases of these studies, for the subject to react to change in the threshold by adjusting his responding to maintain a constant rate of effort. In view of these findings, it is clear that the results obtained in this type of experimentation are significantly influenced by the characteristics of the required response. Thus, specification and control of response characteristics are essential for comparability of results among experiments. Further, the selection of suitable response characteristics will improve the experimental control of behavior and provide a more stable baseline for measuring the effect of other experimental variables.

AD-607 079 Div. 28
OTS Prices: HC $1.00/MF $0.50

Human Factors Research, Inc., Los Angeles, Calif.
IRRELEVANT FACTORS IN THE JUDGMENT OF HUMAN PERFORMANCE.
Technical rept. no. 4,
by Frank L. Herbert, H. D. Kimmel, and James J. McGrath. Sep 64, 20p
Contract Nonr4140 00, Proj. NR153 625

Unclassified report

Report on A Study of Factors Influencing the Judgment of Human Performance.

Descriptors: (*Decision making, Performance (Human)), (*Performance (Human), Decision making), Reasoning, Performance tests, Operators (Personnel), Military personnel, Psychometrics.

AD-607 165 Div. 28, 8
OTS Prices: HC $3.00/MF $0.75

American Inst. for Research, Pittsburgh, Pa.
AN INDEX OF ELECTRONIC EQUIPMENT OPERABILITY: INSTRUCTION MANUAL,
by Dan Payne, James W. Altman, and Robert W. Smith.
31 Jan 62, 62p AIR-C-43-1/62-RP(3)
Contract DA36 039SC80555

Unclassified report

Descriptors: (*Human engineering, Electronic equipment), (*Electronic equipment, Human

Psychophysiology, Psychometrics, Correlation techniques, Rats.

The effects on conditioning performance and extinction of a Fixed Effort (FE) schedule of reinforcement were investigated. A FE schedule is programmed by requiring that the cumulative sum of the efforts of individual responses be larger than a pre-selected constant criterion (specified in gram-seconds). The effort of a response is defined as the time integral of force of the response. The major findings reported in this study are: a decrease in reinforcement rate as a function of the increased effort requirement per reinforcement; an apparent inhibiting effect of high effort requirements on effort per response; no effect of effort per reinforcement on resistance to extinction; a significant increase in the variability of effort per response during extinction; a significant difference between the effort distributions of the 60 gm. -sec. differentiation animals and the 60 gm. -sec. FE animals; and a correlation between the direction and amount of change of effort per response from conditioning to extinction.

AD-607 335 Div. 28
OTS Prices: HC $1.00/MF $0.50

Northwestern Univ., Evanston, Ill.
PSYCHOPATHY, NEUTORTICISM AND VERBAL CONDITIONING: A REPLICATION AND EXTENSION,
by Herbert C. Quay and William A. Hunt.
1962 , 5p
Contract N7ONR1228 11

Unclassified report

Descriptors: (*Criminology, Psychometrics), (*Abnormal psychology, Conditioned reflex), (*Psychoses, Verbal behavior), Neuroses, Personality, Naval personnel, Prisoners, Social psychology, Reaction (Psychology), Analysis of variance.

In a previous paper (Johns and Quay, 1962) it was found that criminal offenders in the military service who had scored high on a factorially derived questionnaire for the measurement of Psychopathic Delinquency failed to condition in a standard verbal conditioning paradigm when compared with a group of offenders who had scored high on a similarly derived scale for Neurotic Delinquency and with a group of controls. The results of this experiment were interpreted as support for the hypothesis that the psychopathic individual is comparatively unresponsive to social reinforcement. This interpretation was in turn related to Cleckley's (1955) concept of Semantic Dementia. Raised, but unanswered, was the question of the relationship of poor conditionability in this group to manifest anxiety and extraversion. Ss for this study were all incarcerated in an institution for more serious offenders in the U. S. Navy. A sample of 458 prisoners, almost the entire population of the facility, was administered the Psychopathy and Neuroticism factor scales (Peterson, Quay and Tiffany, 1961) used in the previous study. Means were computed for the entire sample and one group was then identified who had scored above the mean on Psychopathy and below the mean on Neuroticism; another group was identified who had scored above the mean on Neuroticism and below the mean on Psychopathy.

AD-607 336 Div. 28
OTS Prices: HC $3.00/MF $0.75

California Univ., Berkeley.
BEHAVIORAL RESEARCH DURING THE 1963 AMERICAN MOUNT EVEREST EXPEDITION.
Annual rept. no. 2 (final),
by James T. Lester, Jr. Sep 64, 64p
Contract Nonr3930 00, Proj. NR171 257

Unclassified report

Descriptors: (*Behavior, Stress (Physiology), (*Group dynamics, Behavior), (*Personality, Psychometrics), Sociometrics, Attitudes, Performance (Human), Reasoning, Social psychology.

This project was designed to take advantage of an unusual opportunity to observe men under presumably severe real-life stress, namely the American Mount Everest Expedition of 1963. An extensive personality assessment was done before the team left this country; the principal investigator accompanied the team to the mountain and made informal observations of the men in the field; team members filled out various questionnaires and rating scales before, during, and after the expedition. This data collection program was meant to give information concerning individual personality structures and dynamics, reactions to actual stress, interpersonal behavior in the field, and the process of developing stable interpersonal relationships within the group, as this process has been conceived and studied by Newcomb.

AD-607 357 Div. 28, 18
OTS Prices: HC $5.00/MF $1.00

Boeing Co., Seattle, Wash.
IDENTIFICATION OF OBLIQUE FORMS.
Final rept.,
by C. L. Klingberg, C. L. Elworth, and C. L. Kraft.
Aug 64, 160p
Contract AF30 602 2965, Proj. 8501, Task 850101
RADC TDR64 144

Unclassified report

Descriptors: (*Photointerpretation, Performance (Human)), (*Photointerpretability, Aerial photographs), Target recognition, Vision, Photointerpreters, Optical properties.

Accuracy of form recognition was determined for 45 observers who viewed photographic slide projections of nine military-type targets (3 each of ships, airplanes, ground vehicles). The veiws represented in the imagery included five oblique viewing angles and five orientations (compass directions). They were displayed at three levels each of exposure time, image quality (blur), contrast, and scale ratio. Tests of the statistical significance of the differences in performance as a function of changes in oblique angle of view, orientation of target (with respect to compass direction), image quality, luminance contrast, and exposure time revealed that each main effect was significant ($p < .05$) for at least eight of the nine target-class/scale-ratio combinations. One interaction, obliquity x orientation, was significant ($p < .01$) for all nine combinations. Only 10 of the remaining 81 interactions were significant. Views from corresponding positions on opposite sides of the long axis of a target tended to yield equivalent performance scores. A second study revealed a similar tendency for views balanced about the short axis. (Author)

AD-607 365 Div. 28
OTS Prices: HC $1.00/MF $0.50

Teachers Coll., Columbia Univ., New York.

ness showed the No Communication groups to be the most competent, the Free Communication groups next most competent, and the Limited groups least competent. This result was not anticipated. Detailed analysis suggests that under certain conditions group task performance may be hindered rather than facilitated by certain types of communication. (Author)

AD-607 289 Div. 28
OTS Prices: HC $1.00/MF $0.50

Northwestern Univ., Evanston, Ill.
MANIFEST ANXIETY AND CLINICAL JUDGMENT IN A GROUP SETTING,
by Ronald E. Walker, William E. Walker, and Melvin L. Schwartz. 1963, 4p
Contract Nonr1228 18

Unclassified report

Prepared in cooperation with Loyola Univ., Chicago, Ill.
To be published in the Journal of Social Psychology.

Descriptors: (*Anxiety, Performance (Human)), (*Group dynamics, Anxiety), Social psychology, Performance tests, Reaction (Psychology), Behavior, Reliability, Psychometrics, Correlation techniques, Stress (Psychology).

The results in the present series of studes, HA subjects demonstrating equal or better performance than LA subjects, could be explained by integrating the formulation of Child (1954) and a later formulation by Spence (1963). Child has hypothesized better performance for HA when irrelevant response tendencies do not interfere with task relevant behavior. Spence has maintained that the intensity of task irrelevant responses is a function of the degree of psychological stress in an experiment. Both the three individual (Hunt and Walker, 1963) and the present three group performance studies were run under neutral or non-stress conditions. It is assumed, however, that if the two series of studies were placed on a stress continuum, the group condition would be judged as less stressful for subjects and thus less conducive to the arousal of task irrelevant responses. If the group condition actually did result in the arousal of fewer task irrelevant responses, the HA subjects with higher drive (D) would be expected to perform at least as well as or better than the LA even on a relatively complex judgment task. (Author)

AD-607 290 Div. 28
OTS Prices: HC $1.00/MF $0.50

Northwestern Univ., Evanston, Ill.
RELIABILITY OF CLINICAL JUDGMENTS AS A FUNCTION OF RANGE OF PATHOLOGY,
by William A. Hunt, Melvin L. Schwartz, and Ronald E. Walker. 1963, 3p
Contract Nonr1228 18

Unclassified report

Prepared in cooperation with Loyola Univ., Chicago, Ill.
To be published in the Journal of Abnormal Psychology.

Descriptors: (*Abnormal psychology, Performance tests), Reasoning, Reaction (Psychology), Reliability, Test methods, Mental disorders, Psychometrics, Correlation techniques.

In an informational analysis of clinical judgment, Miller and Bieri (1963) note 'the rather good agreement by the subjects in regard to the two extreme cases in each stimulus domain,' and note this agreement with psychophysical research where 'extreme stimuli are judged more reliably than are middle-range stimuli.' They further suggest 'it would be of interest to pursue this notion in further research by systematically varying the range of pathology from which the stimulus materials are to be drawn.' During an extensive study of the factors influencing clinical judgment (Hunt and Jones, 1962), the authors accumulated extensive data involving judgments on a 7-point scale of the amount of confusion in patients' thinking as revealed in their individual test responses. These data are amenable to analysis in terms of the standard deviation of the judgments for any scale point. If the relationship noted by Miller and Bieri is a general one, then it would be expected that the standard deviations would be less at the extremes of the scale and larger in the middle ranges.

AD-607 291 Div. 28
OTS Prices: HC $1.00/MF $0.50

Northwestern Univ., Evanston, Ill.
JUDGMENTAL BIAS IN THE DIFFERENTIATION OF PROCESS AND REACTIVE SCHIZOPHRENIA,
by William A. Hunt, Melvin L. Schwartz, and Ronald E. Walker. 1964, 2p
Contract Nonr1228 18

Unclassified report

Prepared in cooperation with Loyola Univ., Chicago, Ill.
To be published in the Journal of Clinical Psychology.

Descriptors: (*Mental disorders, Diagnosis), (*Abnormal psychology, Performance tests), Psychometrics, Test methods, Reasoning, Reaction (Psychology), Correlation techniques.

In a previous study the authors found that what little success experienced judges had in differentiating process from reactive schizophrenia on the basis of patients' responses on a vocabulary test was attributable to a preconception that the process schizophrenics would show more confusion in their thinking than would the reactives. The correlation between the tendency of the judges to label the response typical of process schizophrenia and the amount of thought confusion exhibited in it (as established by an independent group of judges) was +.93, although there actually was no significant difference in the mean confusion scores of the two schizophrenic groups. The danger of such biases is obvious and a replication seemed in order using a new group of judges and responses to the Wechsler Bellevue Form I Similarities sub-test instead of vocabulary test materials. Except for the change in test materials the procedure followed exactly that of the original study. The Similarities test responses were obtained from the same carefully selected group of 10 process schizophrenics and 10 reactives. The 15 judges were new to the task, but all had the Ph.D. degree and at least 5 years of clinical experience. The first group of 5 rated each individual response for the amount of confusion exhibited using a 7 point scale. Another 5 were asked to decide whether each item was produced by a process or a reactive patient.

AD-607 325 Div. 28
OTS Prices: HC $4.00/MF $1.00

Behavioral Systems Lab., Princeton Univ., N. J.
A FIXED EFFORT SCHEDULE OF REINFORCEMENT.
Technical rept. no. 5,
by Maxwell A. Morfield. Jun 64, 128p
Contract Nonr1858 19

Unclassified report

Doctoral thesis.

Descriptors: (*Conditioned reflex, Behavior), (*Behavior, Conditioned reflex), Performance tests, Reaction (Psychology), Reflexes, Energy, Scheduling, Probability,

30. Research and Research Equipment

AD-606 950 Div. 30, 8
OTS Prices: HC $2.00/MF $0.50

Sylvania Electric Products, Inc., Waltham, Mass.
RESEARCH PROGRAM TO EXTEND THE THEORY OF WEIGHT DISTRIBUTION AND RELATED PROBLEMS FOR CYCLIC ERROR-CORRECTING CODES.
Summary scientific rept. for Jun 62-May 63,
by H. Frazyer Mattson, Jr. Jul 63, 40p S-1015-2
Contract AF19 604 8516, Proj. 5628, Task 562801
AFCRL 63 321; N63 23375

Unclassified report

Formerly listed as AD-449 000.

Descriptors: (*Coding, Scientific research), Errors, Corrections, Groups (Mathematics), Conformal mapping, Invariance, Projective geometry.

In Section I of the report methods of induced representations were applied to questions of weight distribution in certain quadratic residue codes. This section is partly an exposition of work of Gleason and Prange. If the prime p denotes the block length of this cyclic (p,(p+1)/2) code (over GF(q) for certain q), the coordinate indices are identified with the finite points on the projective line over GF(p). A new coordinate was then introduced for the infinite point, so that the code is replaced by a (p+1, (p+1)/2) code. The main result (due to Gleason and Prange) was that this new code is invariant under the permutation of coordinates (with sign changes, in general) induced by the projective unimodular group acting on the coordinate indices. This property allows one to deduce some results on the congruence of the weights modulo various m, especially when q = 2. In Section II a class of cylcic codes over GF(2) of block length 3p, where p is prime and 2 has even multiplicative order h modulo p, were defined. These codes have the property that all odd weights in them are at least p. Whether the even weights are at least of the order of p is not known; but the smallest even weight found in any of these codes so far is at least p - 1.

AD-606 972 Div. 30, 4, 25
OTS Prices: HC $4.00/MF $0.75

Air Force Materials Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
PERFORMANCE AND APPLICATION OF A DOUBLE-BEAM INFRARED SPECTROPHOTOMETER IN THE REGION 350 TO 50 cm(-1).
Rept. for Mar 63-Apr 64,
by Neil T. McDevitt and Adele L. Rozek. Aug 64, 104p
Proj. 7360, Task 736005
ML TDR64 192

Unclassified report

Prepared in cooperation with Cincinnati Univ., Ohio.

Descriptors: (*Spectrophotometers, Operation), (*Infrared spectroscopy, Spectrophotometers), Spectrum analyzers, Calibration, Performance (Engineering), Absorption spectrum, Water vapor, Organic compounds, Inorganic compounds, Oxides, Spectra (Infrared).

A discussion is presented of calibration and performance of a far infrared double-beam spectrophotometer in the region 350 to 50 cm(-1). The spectrum of the pure rotational absorption bands of water vapor as recorded with a Perkin-Elmer Model 301 is shown for this region.

AD-607 037 Div. 30, 9
OTS Prices: HC $3.00/MF $0.75

Giannini Controls Corp., Malvern, Pa.
MODEL FLY PROGRAM. PART I. THEORETICAL INVESTIGATIONS AND PRELIMINARY DESIGN CONSIDERATIONS.
Status rept. for 1 Sep 62-31 Aug 63,
by J. A. Hill, X. A. Gikas, A. G. Fonda, and A. J. Gargani. Jul 64, 88p
Contract AF33 616 8260, Projs. 1469, 8219,
Tasks 146901, 821901
FDL TDR64 49 P1

Unclassified report

Descriptors: (*Wind tunnels, Design), Wind tunnel models, Construction, Aeroelasticity, Control systems, Simulation, Suspension devices, Instrumentation, Data processing systems.

A status report of the MODEL FLY program is presented. The report presents the results of the preliminary considerations for development of the MODEL FLY testing technique. The MODEL FLY program objective is to develop a wind tunnel testing technique for simulating the effects of aeroelasticity on the structural loads and stability and control response of full scale vehicles. A dynamic mounting system is to be developed which allows scaled elastic models to perform 'free flight' maneuvers in the wind tunnel. The MODEL FLY development encompasses six technical areas: similitude theory, model construction, mounting system, control theory, instrumentation, and data processing. The problems in each area are discussed and possible methods of solution outlined. The present status of the development is summarized and future direction discussed. (Author)

AD-607 117 Div. 30, 25
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
APPLICATION OF HETERODYNE ANALYZERS TO PULSE ANALYSIS.
Master's thesis,
by J. S. Quinn and C. E. Thomas. Aug 64, 116p
AFIT GE/EE/64 16

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Shock waves, Measurement), (*Wave analyzers, Shock waves), Phase measurement, Sampling, Fourier analysis, Series, Intergral transforms, Amplitude modulation, Statistical data.

Measurement of the amplitude and phase spectra of shock pulses is investigated. Sampling theory is used to show that these spectra may be uniquely defined by samples which can be determined from measurements made on a periodic extension of the shock pulse. It is shown that heterodyne analyzers can be used to measure the amplitude spectrum samples. An original phase angle measurement system is described. The described system is used to measure the spectra of shock pulses and is shown to provide adequate results. (Author)

AD-607 122 Div. 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEW ELECTRONIC COMPUTERS FOR ENGINEERING AND PLANNED-ECONOMY CALCULATIONS,

TECHNIQUES OF INDUCING COOPERATION BETWEEN ADVERSARIES.
Annual status rept.,
by Morton Deutsch. 1 Oct 64, 9p
Contract Nonr4294 00

Unclassified report

Descriptors: (*Group dynamics, Psychometrics), (*Attitudes, Psychometrics), Behavior, Analysis, Reasoning, Social psychology, Decision making, Bargaining, Game theory.

Two main studies were conducted: a role-reversal study and studies involving the Prisoners Dilemma Game. In both studies, the data were collected but not, as yet, fully analyzed. Each study is described in terms of its objectives, procedure, and presently available results.

29. Quartermaster Equipment and Supplies

No Entries

Gaitenby, and George Sholes
Output characteristics and construction of an interim word reading machine, by Paul Brubaker, Franklin S. Cooper, Jane Gaintenby, and Eugene Peterson
The development and evaluation of optophone devices for the blind, by John L. Coffey
The development and evaluation of a personal reading machine for the blind, by Hans A. Mauch and Glendon C. Smith.

AD-607 209 Div. 30, 14, 17
OTS Prices: HC $1.00/MF $0.50

Air Force Materials Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
A CALORIMETER FOR MEASURING THE LOW TEMPERATURE HEMISPHERICAL EMISSIVITY OF METALLIC AND CERAMIC SURFACES.
Technical documentary rept. for 1 Jul 63-1 Apr 64, by Gerard L. Haury. Aug 64, 10p
Proj. 7360, Task 736001
ML TDR64 223

Unclassified report

Descriptors: (*Materials, Low temperature research), (*Calorimeters, Cryogenics), (*Cryogenics, Emissivity), (*Emissivity, Hemispherical shells), Metals, Ceramic materials, Helium, Liquefied gases, Evaporation, Thermal radiation, Calibration, Design, Aluminum, Honeycomb cores, Sandwich construction, Tests.

An apparatus was designed, constructed, and calibrated for the measurement of the hemispherical emissivity of metallic and ceramic surfaces at temperatures down to 60K. The technique is based upon the measurement of the rate of evaporation of liquid helium to determine the heat flux. Accuracy of the apparatus was determined to be ±3 percent based upon a calibration using known heat inputs. Data are presented for an aluminum honeycomb structure and alumina. (Author)

AD-607 220 Div. 30, 14
OTS Prices: HC $3.00/MF $0.75

Midwest Research Inst., Kansas City, Mo.
INVESTIGATION OF ELECTRO- AND MAGNETO-OPTIC TECHNIQUES FOR INFORMATION STORAGE AND RETRIEVAL.
Technical documentary rept. for 1 May 64-31 Jul 64, by R. A. Connell. Sep 64, 74p
Contract AF33 657 11560, Projs. 7062, 2699P, Task 706201
AL TDR64 228

Unclassified report

Descriptors: (*Data processing systems, Materials), (*Thin films (Storage devices), Production), (*Manganese compounds, Bismuth compounds), Data storage systems, Information retrieval, Intermetallic compounds, Ferromagnetic materials, Magneto-optic effect, Optical properties, Crystals, Evaporation, Powders, Crystal structure.

A program of research on materials for high density information storage and retrieval was conducted, with emphasis on the fabrication of thin films of MnBi. This intermetallic compound is ferromagnetic, with its axis of easy magnetization along its hexagonal c-axis. Polycrystalline films of this material generally show a strongly preferred orientation, with the c-axis normal to the plane of the film. Such a configuration is ideal for the employment of magneto-optical read-out systems. Major problems exist in the control of nucleation and growth of suitably oriented MnBi, and it was here that maximum effort was made. Several fabrication techniques were tried, including physical sputtering, grain-by-grain flash evaporation of both mixed powders and preformed alloy powder, and sequential evaporation schemes. The latter method gave the best results in spite of problems in interlayer diffusion and compound formation. (Author)

AD-607 228 Div. 30, 15
OTS Prices: HC $1.00/MF $0.50

Digital Systems Lab., Princeton Univ., N. J.
IMPLICATION TECHNIQUES FOR BOOLEAN FUNCTIONS.
Technical rept.
by R. S. Gaines. Aug 64, 11p PU-DSL-39

Unclassified report

Supported in part by the Bell Telephone Labs., Murray Hill, N. J. Prepared for presentation at the Annual Symposium (5th) on Switching Circuit Theory and Logical Design, Princeton, N. J., Nov 11-12, 13, 1964.

Descriptors: (*Special functions (Mathematical), Computer logic), (*Computer logic, Special functions, Mathematical)), Switching circuits, Mathematical logic, Numerical analysis, Prime numbers, Matrix algebra, Circuits, Computers.

This paper presented several uses of the logical connective of implication to problems of interest in switching theory. The implications which hold among the prime implicants of a function were examined. A new set of necessary and sufficient conditions for determining essential prime implicants and a rapid approximate method for obtaining minimal sums were included. (Author)

AD-607 229 Div. 30
OTS Prices: HC $1.00/MF $0.50

Digital Systems Lab., Princeton Univ., N. J.
ON THE MINIMUM STAGE REALIZATION OF SWITCHING FUNCTIONS USING LOGIC GATES WITH LIMITED FAN-IN.
Technical rept.,
by G. L. Hicks and A. J. Bernstein. Aug 64, 14p
PU-DSL-38

Unclassified report

Descriptors: (*Switching circuits, Gates (Circuits)), (*Gates (Circuits), Switching circuits), (*Computer logic, Special functions (Mathematical)), Mathematical logic, Optimization, Time lag theory, Circuits.

In this paper a method was presented for reducing the number of stages of logic in the realization of an arbitrary Boolean function when an upper bound exists on the fan-in at each gate. A procedure for obtaining the minimum stage realization of the function in sum of products form was first developed. The use of factoring to reduce the number of stages below this minimum was then described. (Author)

AD-607 328 Div. 30
OTS Prices: HC $3.00/MF $0.75

Office of Aerospace Research, Washington, D. C.
OAR QUARTERLY INDEX OF CURRENT RESEARCH RESULTS, 1 APRIL-30 JUN 1964.
30 Jun 64, 79p

Unclassified report

See also AD-600 160.

by V. I. Loskutov. 22 Sep 64, 12p
FTD TT64 631; TT 64 71530

Unclassified report

Unedited rough draft trans. of Stanki i Instrument (USSR) 1964, v. 35, no. 1, p. 26-28.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Digital computers, USSR), Programming (Computers), Scientific research, Engineering, Economics, Data processing systems, Design.

A description is given of the basic characteristics of new electronic digital computers type Minsk and Promin' being produced industrially for operation with engineering and planned-economy problems. (Author)

AD-607 139 Div. 30, 8, 25
OTS Prices: HC $6.00/MF $1.25

RCA Defense Electronic Products, Camden, N. J.
DEVELOPMENT OF A TACTICAL FIELD COMPUTER (MICROPAC) (TASKS 25B AND 27B).
Formal engineering rept.
Sep 64, 240p
Contract DA36 039sc75968

Unclassified report

Descriptors: (*Microminiaturization (Electronics), Digital computers), (*Digital computers, Microminiaturization (Electronics)), (*Modules (Electronics), Microminiaturization (Electronics)), Computers, Mobile, Tactical warfare, Data processing systems, Reliability (Electronics), Solid state physics, Heat transfer, Circuits, Power, Design, Construction, Wiring diagrams, Feasibility studies.

A breadboard model of the Micropac Computer was fabricated and evaluated to prove the basic logical design using conventional components of the same specification as their microelement counterparts and packaged in modules. The breadboard computer was subjected to a thorough operational check-out by means of test routines. Mechanical design considerations were paramount in the development of the Micropac computer since miniaturization emphasizes minimum size, weight, and volume; modular and plug-in card construction; interconnection methods; thermal problems; accessibility; interchangeability; and reliability. To minimize the size and weight of the power supply, conventional methods of line current rectification were abandoned in favor of lossless regulation and conversion to 400-cycles operation, thereby necessitating advanced circuitry techniques. Another problem concerned the selection of high-speed random-access memory, for which a coincident-current type memory was well suited. The structural design had to meet a high strength to weight requirement. Module temperature control was a prime consideration in the packaging technique. Evidence and experience resulting from performance and testing of the Micropac Computer led to the conclusion that the micromodule is entirely feasible for applications of this nature.

AD-607 154 Div. 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CYBERNETICS AND TECHNICAL PROGRESS,
by A. Berg. 21 Sep 64, 11p
FTD TT64 406; TT 64 71545

Unclassified report

Unedited rough draft trans. from Pravda, Moscow (USSR) 1961, no. 315, 10 Nov, p. 3.

Descriptors: (*Cybernetics, Scientific research), Control systems, Automation, Computers, USSR.

A report is given on the development and application of cybernetics in the U.S.S.R.

AD-607 156 Div. 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PNEULOG: NEW SYSTEM OF PNEUMATIC LOGICAL CONTROL,
by Milan Balda. 16 Sep 64, 12p
FTD TT64 507; TT 64 71542

Unclassified report

Unedited rough draft trans. of Automatizace (Czechoslovakia) 1962, v. 5, no. 3, p. 58-60.

Descriptors: (*Computers, Pneumatic systems), (*Computer logic, Control systems), Circuits, Signals, Transistors, Relaxation oscillators, Czechoslovakia.

AD-607 189 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
USE OF THE SPECIAL PROGRAM DEVICE ON THE 417 TABULATOR,
by Bruno Chiappinelli. 26 Jul 51, 8p RM-657

Unclassified report

Descriptors: (*Computers, Programing (Computers)), (*Programing (Computers), Computers), Wiring diagrams.

Expansion of total programs from three to twenty-eight on the IBM 417 tabulator by use of the special program device. (Author)

AD-607 205 Div. 30, 16
OTS Prices: HC $1.00/MF $0.50

Prosthetic and Sensory Aids Service, Veterans Administration, New York.
DEVELOPMENTS IN THE VETERANS ADMINISTRATION RESEARCH PROGRAM ON AIDS FOR THE BLIND.
Summary rept.,
by Howard Freiberger. 1 Oct 64, 22p
VA-PSASN M/R-641001

Unclassified report

Descriptors: (*Research program administration, Blindness), (*Blindness, Research program administration), Prosthetics, Auditory perception, Speech recognition, Speech representation, Sounds, Training, Training devices, Reading machines, Touch, Earphones, Learning.

Contents:
Fabrication of obstacle detectors for the blind, by Thomas A. Benham, J. Malvern Benjamin, Jr., and D. Ridgely Bolgiano
Research on human perception of objects by use of pulsed sound, by John J. Dreher and Ralph G. Beil
Spelled speech for automatic readers usable by the blind, by Milton Metfessel and Constance Lovell
Research on audible outputs of reading machines for the blind, by Franklin S. Cooper, Robert Epstein, Jane

AD-607 383 Div. 30
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
SHAPE PARAMETERS OF THE CLOSED MAGNETIC NOZZLE,
by Lee Heflinger. 2 Feb 57, 10p RW(ARL)-7-2
Unclassified report

Descriptors: (*Nozzles, Geometric forms), Magnetic fields, Mathematical analysis, Computers.

AD-607 398 Div. 30
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D.C.
DATA HANDLING SYSTEM FOR BENDIX G-15D DIGITAL COMPUTER.
Interim rept.,
by G. V. Olds, C. McCoy, Jr., and H. L. Peterson.
23 Sep 64, 26p
Proj. RF001 03 44 4054
NRL 6144
Unclassified report

Descriptors: (*Digital computers, Systems engineering), (*Data processing systems, Digital computers), Data storage systems, Input-output devices, Compilers, Computer logic, Control sequences, Programming (Computers).

This report describes methods and equipment used for transferring experimental data into a digital computer (Bendix G-15D). The data is obtained at remote field stations by sampling, encoding, and storing in digital form on magnetic tape, signals obtained during experiments concerning underwater sound. The computer is used for correlation studies and other statistical analyses. The system described includes provision for the reading of continuous field tapes into the computers, selection of data by means of visual display, and an x-y plot of results. Details of hardware and programs using the G-15D computer as central processor are discussed. (Author)

AD-607 408 Div. 30, 8, 20
OTS Prices: HC $5.00/MF $1.25

International Business Machines Corp., Oswego, N. Y.
AUTOMATED DIGITAL COMPUTER PROGRAM FOR DETERMINING RESPONSES OF ELECTRONIC SYSTEMS TO TRANSIENT NUCLEAR RADIATION. VOLUME II. PREDICT CIRCUIT ANALYSIS PROGRAM.
Annual rept. no. 2, vol. 2.
Aug 64, 193p
Contract AF29 601 5399, Proj. 5776, Task 577602
WL TDR64 62 V2
Unclassified report

Prepared in cooperation with Defense Atomic Support Agency, Washington, D. C.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Radiation damage, Programming (Computers)), (*Programming (Computers), Circuits), (*Circuits, Analysis), Topology, Differential equations, Matrix algebra, Transients, Resistors, Coils, Capacitors, Digital computers, Operation, Instruction manuals.

PREDICT is an IBM/7090/7094 program which automatically solves, from a description of the network topology, built-in differential and algebraic matrix equations which completely characterize the behavior of a complex network. The general approach in the PREDICT formulation does not limit it to radiation applications; the radiation problem is treated as a special case of the general circuit analysis problem. The volume contains information useful to circuit analysts and computer programmers for application of this program. A detailed description of PREDICT, a discussion of its use and operation, and example problems are included to demonstrate and verify its operation at other computing facilities. The last section contains information on machine requirements and off-line equipment necessary for the PREDICT system. (Author)

AD-607 409 Div. 30, 8, 20
OTS Prices: HC $7.00/MF $1.50

International Business Machines Corp., Oswego, N.Y.
AUTOMATED DIGITAL COMPUTER PROGRAM FOR DETERMINING RESPONSES OF ELECTRONIC SYSTEMS TO TRANSIENT NUCLEAR RADIATION. Volume III. TREAT COMPONENT ANALYSIS PROGRAM.
Annual rept. no. 2, vol. 3.
Aug 64, 302p
Contract AF29 601 5399, Proj. 5776, Task 577602
WL TDR64 62 V3
Unclassified report

Prepared in cooperation with Defense Atomic Support Agency, Washington, D. C.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.
See also AD-607 408.

Descriptors: (*Radiation damage, Programming(Computers)), (*Programming (Computers), Electronic equipment), (*Electronic equipment, Analysis), Transistors, Diodes (Semiconductor), Capacitors, Transients, Digital computers, Operation, Instruction manuals.

The TREAT (Transient Radiation Effect Automated Tabulation) system of six independent, but complementary, digital computer programs was developed to aid in the processing of data on transient and permanent effects of radiation on electronic components. Each program treats a particular aspect of the over-all processing task. Given raw laboratory data recorded before and after irradiation, the system provides calculated device parameters for each sample and the radiation induced change in these parameters. These data are combined with radiation environment information, also processed by the system, and applied to theoretical equations to predict the response or damage to device parameters during irradiation. Information on typical rather than specific devices and/or radiation environments is also available for typical response predictions. As many as 1000 samples each of transistors, diodes, and capacitors can be processed concurrently. The report contains a complete functional description of the system as well as all necessary operating instructions. (Author)

Descriptors: (*Air Force research, Indexes), (*Indexes, Air Force research), Bibliographies, Aeronautics, Astronautics, Scientific research, Classification.

AD-607 358 Div. 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DESIGN PRINCIPLES FOR AN INTELLIGENT MACHINE,
by M. E. Maron. Mar 62, 26p P-2572
Unclassified report

Prepared for presentation at The International Symposium on Information Theory, Brussels, Belgium, 3-7 Sep 62.

Descriptors: (*Artificial intelligence, Design), (*Nerve cells, Models (Simulation)), Bionics, Automata, Mathematical logic, Probability, Learning, Memory, Simulation, Digital computers.

This paper discussed the role of prediction as the key process underlying the function of an intelligent machine. A model of a 'neuron' was presented which exhibits properties of memory and learning. The formalism of the calculus of probability allows one to interpret the behavior of a neuron in such a way as to justify how a network of such elements can be organized so that it can learn to predict. (Author)

AD-607 361 Div. 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INTRODUCTION TO ELECTRONIC COMPUTERS.
CHAPTER 4: PROGRAMMING AND CODING,
by F. J. Gruenberger and D. D. McCracken.
Oct 61, 37p P-2451-1
Unclassified report

Descriptors: (*Computers, Textbooks), (*Programming (Computers), Preparation), Programming languages, Mathematics, Compilers, Data storage systems, Digital computers, Operation.

An introduction is given to coding, an activity of computer programming that follows flowcharting. Coding is defined as the translation of the flowchart information into a language or instruction the machine can accept.

AD-607 362 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INTRODUCTION TO ELECTRONIC COMPUTERS.
CHAPTER 19. GAME PLAYING,
by F. J. Gruenberger and D. D. McCracken. Mar 62,
12p P-2559
Unclassified report

Descriptors: (*Computers, Textbooks), (*Game theory, Computers), Programming (Computers), Digital computers, Numbers, Mathematics, Compilers, Computer logic, Decision theory, Operation.

The application of computers to game playing is introduced, with emphasis on the games of Nim and Qware. It's relationship to solving problems; how to simulate the decision processes that humans exercise in problem situations is considered.

AD-607 363 Div. 30
OTS Prices: HC $3.00/MF $0.75

Systems Research Labs., Inc., Dayton, Ohio.
A NEW APPROACH TO COMPUTER COMMAND STRUCTURES.
Final rept., add. for 15 Sep 63-15 Mar 64,
by C. K. Kim, L. E. Irwin, and E. B. Maier.
May 64, 97p
Contract AF30 602 2741, Proj. 5581. Task 558102
RADC TDR64 135
Unclassified report

Descriptors: (*Programming languages, Algebra), (*Computer logic, Control sequences), (*Group (Mathematics), Programming languages), (*Algebra, Programming languages), Programming (Computers), Mathematics.

The purpose of the research under this contract extension was to investigate programming manipulation and associated problems using the algebraic computer language (theta-language) developed previously under this research contract. The report contains a refinement of the theta-language, the description of the metalanguage as a source language, the definition of the theta-language in terms of metalanguage, the establishment of the theta-language as a precedence language, and the syntactic structure of the theta-language. It also contains the programming manipulation of the theta-language, the theoretical investigation of the prime phase structure of the theta-language, and application of linear graph theory to programming control. (Author)

AD-607 381 Div. 30, 22
OTS Prices: HC $5.00/MF $1.00

Space Sciences Lab., Univ. of California, Berkeley.
DYNAMIC PERFORMANCE OF PRESSURE TRANSDUCERS IN SHOCK AND DETONATION TUBES.
Technical note no. 9,
by William E. Amend, A. J. Laderman, and A. K. Oppenheim. Sep 64, 158p SSL(UC)5-48, IER-64-13
Contract NAS8 2634; Grant AF AFOSR129 64
AFOSR 64 1892
Unclassified report

Prepared in cooperation with Institute of Engineering Research, Univ. of California, Berkeley.
Legibility of this document is in part unsatisfactory.
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Descriptors: (*Shock tubes, Transducers), (*Transducers, Calibration), Detonations, Pressure, Thrust, Combustion chambers, Frequency, Dynamics, Linear systems, Performance (Engineering), Fourier analysis, Integral transforms, Programming (Computers), Programming languages, Computer storage devices.

A method is presented for evaluating the dynamic performance of high frequency pressure transducers on the basis of records obtained by means of shock tube calibration tests. The transducer's frequency response is determined from a Fourier transform analysis. The computations were programmed for the IBM 7090 computer including provision for the use on the cal-comp plotter to produce results describing the frequency dependence of the amplitude ratio, phase angle shift, and time lead between the output and input signal. Performance characteristics were calculated for several typical transducers, demonstrating the utility of the method in delineating frequency regimes where reliable response of the instrument can be expected. A number of commercial pressure transducers were tested in shock and detonation tubes. Records obtained from the former provide information on the natural frequencies and rise times of the sensors, while results of the latter were used to illustrate the effects of rapidly varying pressures and temperatures on the performance of the instruments. (Author)

32. Miscellaneous Arts and Sciences

AD-606 906 Div. 32, 13
OTS Prices: None/MF $0.50

RAND Corp., Santa Monica, Calif.
IS WATER DIFFERENT
by J. C. DeHaven. Rev. 25 May 60, 18p P-1349-RC
Unclassified report

Document is available in microfiche only.

Descriptors: (*Water supplies, California), (*Economics, Water supplies), Irrigation systems, Costs, United States government, Dams, Money, Industries, Water.

Water is not different from other resources in most of the ways it is often discussed. It has no unique, magical properties by itself to create wealth, nor to cause the development of a region. Water is different in that features of its supply, custom, and the development of water law have placed it largely in the public domain. Consequently, the development of new supplies and its distribution is often the responsibility of government agencies. For this reason, special problems arise in the division of the available supply among user categories and between regions. Decisions in these matters are often made in the political arena instead of in the market place as with most other resources. Even so, it is important that the citizen-taxpayer become informed of the economic aspects of water supply. Otherwise, water development decisions by government agencies may result in the wasteful investment of our other resources to produce more water. Large dams and lengthy aqueducts for transferring water between regions are not the only alternative sources of increased water for our region. In fact, they may often be the most costly.

AD-606 907 Div. 32, 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE POLITICAL POSITION OF THE SOVIET ARMY SINCE STALIN,
by Leon Goure. 23Apr 58, 24p P-1351
Unclassified report

Paper prepared for publication in The New Leader's series of articles on Russia since Stalin.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Political science, USSR), (*Army, USSR), (*Communism, Armed forces (Foreign)), Leadership, Military personnel, Officer personnel, Government (Foreign), Armed forces budgets, Foreign policy.

The relationship of the Soviet Army to the Communist Party and its leaders has always been complex and generally unsatisfactory to all concerned. The security of the Soviet state demands that there be powerful armed forces at its disposal. But while the Party is a minority elite group, the armed forces are national in character and the Communists have always disrupted the people. The masters of the Soviet Union who cannot forget that the armed forces, by their nature, are potentially the strongest element in the state, have consequently always feared Bonapartism. The Party therefore has to subordinate the military to its will and to control it very closely. Various party organizations and the special department of the security police have maintained such controls at all levels of the armed forces. Although always extensive, the actual degree of party control has varied with the leadership's views concerning the loyalty of the armed forces as well as with the requirements of military efficiency. (Author)

AD-606 909 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOVIET INDUSTRY FIVE YEARS AFTER STALIN,
by Oleg Hoeffding. 28 Apr 58, P-1354
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Industrial production, USSR), (*USSR, Industrial production), (*Economics, USSR), Government (Foreign), Communism, Leadership, Consumption, Industries, Management planning.

For Soviet industry, the five years since Stalin's death were a period of continuous readjustment to a succession of economic policy changes which reflected the contentions among the top political leadership during Khrushchev's ascent to exclusive power. Considering the vacillations of policy, and re-shuffling of the machinery of administration and planning to which Soviet industry has been exposed, its over-all performance was remarkably impressive.

AD-606 914 Div. 32, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AGGREGATION OF UTILITY FUNCTIONS,
by Edmund Eisenberg. 14 Jul 58, 30p P-1363
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nonlinear programming, Game theory), (*Economics, Sociology), (*Distribution (Economics), Mathematical models), Functions, Mathematical programming, Theorems.

The author shows that if in an economy each consumer has a fixed income and acts so as to maximize a concave, continuous and homogeneous utility function, then both a social welfare and a community utility function exist. (Author)

AD-606 920 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TALMUDISM IN SOVIET POLITICS,
by Myron Rush. 2 Jan 59, 16p P-1373 rev.
Unclassified report

Descriptors: (*Political science, USSR), (*USSR, Political science), Government (Foreign), Communism, Leadership, Social communication, Social sciences.

The researches of talmudists, just as all serious studies of current Soviet politics, can usefully contribute to academic research on the Soviet political system. They can provide valid evidence on important problems, bring plausible hypotheses to areas of admitted ignorance, and raise provocative objections to views held uncritically. More generally, they can stimulate reflection on the very nature of the Soviet political system.

AD-606 932 Div. 32, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMMENTS ON 'TECHNOLOGICAL POLICY AND ECONOMIC CALCULATION IN SOVIET INDUSTRY,' BY DAVID GRANICK,

31. Ships and Marine Equipment

AD-606 967 Div. 31
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.
THE EFFECT OF PROPELLER CAVITATION ON THRUST DEDUCTION, A THEORETICAL EXAMINATION,
by D. M. Nelson. Sep 64, 44p
NOTS TP3564; NAVWEPS 8549

Unclassified report

The work was carried out to check the accuracy of statements made in one of the reports presented by the Soviet Union delegation at the International Towing Tank Conference (10th) Teddington, England, Sep 63.

Descriptors: (*Propellers (Marine), Cavitation), (*Thrust, Cavitation), Models (Simulations), Propeller blades, Theory.

A simple, idealized, theoretical model is used to examine the effect of propeller cavitation on thrust deduction. This study has yielded not only a qualitative understanding of how the presence of cavitation results in a decrease in thrust deduction, but also a rough quantitative estimate of the conditions that result in zero thrust deduction. The findings verify statements made in a recently published Soviet Union report. (Author)

AD-606 984 Div. 31
OTS Prices: HC $3.00/MF $0.75

Hydronautics, Inc., Laurel, Md.
HIGHER ORDER EFFECT ON WAVES OF BULBOUS SHIPS,
by B. Yim. Aug 64, 70p Hydro-TR-117-5
Contract Nonr3349 00, Proj. NR062 266

Unclassified report

Descriptors: (*Ships, Hydrodynamics), (*Water waves, Ships), Surface properties, Ship hulls, Functions, Mathematical analysis.

AD-607 245 Div. 31
OTS Prices: HC $5.00/MF $1.00

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
ESTIMATION OF STABILITY DERIVATIVES AND INDICES OF VARIOUS SHIP FORMS, AND COMPARISON WITH EXPERIMENTAL RESULTS,
by Winnifred R. Jacobs. Sep 64, 182p SIT-DL-1035
Contract Nonr263 57, Proj. 2803 063

Unclassified report

Descriptors: (*Ship hulls, Fluid dynamic properties), Differential equations, Maneuverability, Stability, Hydrodynamic configurations, Ship models, Yaw, Ship structural components, Mathematical analysis, Experimental data, Roll.

An analytical method for estimating stability derivatives, and hence stability on course, which combines Albring's empirical modifications of simplified flow theory with low aspect-ratio wing theory, is extended to take into consideration the effects on course stability of higher aspect-ratio fins as well. The method, which had been applied in the earlier report to a family of eight hulls of 0.5 block coefficient, is tested further by application to eight Series 60 forms differing in block coefficient as well as in beam, draft, and displacement - with and without rudders; to an extreme vee modification of a Series 60 model; and to three other forms - a Mariner Class model, a destroyer, and a hopper dredge. Comparison with experimental results shows that the values of stability derivatives and indices determined by the analytical method are of the right orders of magnitude and indicate correct trends. Application to a variety of ship forms has demonstrated that the method can predict relative effects of changes in the geometry of a ship form, as well as the effects of changes in skeg and rudder area. (Author)

AD-607 070 Div. 31, 14
OTS Prices: HC $1.00/MF $0.50

David Taylor Model Basin., Washington, D. C.
CYCLIC-LOADING TESTS OF TWO GLASS-REINFORCED PLASTIC CYLINDERS,
by Peter M. Palermo. Nov 62, 18p
DTMB 1653

Unclassified report

Descriptors: (*Filament wound construction, Composite materials), (*Composite materials, Filament wound construction), (*Submarine hulls, Filament wound construction), (*Laminated plastics, Glass textiles), Reinforcing materials, Cylindrical bodies, Pressure vessels, Hydrostatic pressure, Fatigue (Mechanics), Model tests, Loading (Mechanics), Rings, Tapes, Strain (Mechanics), Creep, Structural shells.

Cyclic tests were conducted on two ring-stiffened, glass-reinforced plastic cylinders of two different designs. Both were subjected to a pressure variation from 0 to 4000 psi, that is, two-thirds of the collapse pressure of similar models, and failed after 86 and 442 cycles. Serious consideration to fatigue life of glass-reinforced plastic is therefore indicated if this material is to be used for pressure hulls which must have long service life and which must withstand relatively high strains and repeated loadings. (Author)

U. K., and the U. S. A. in the field of energy production and distribution.

AD-606 949 Div. 32, 15
OTS Prices: HC $3.00/MF $0.75

Northwestern Technological Inst., Evanston, Ill.
PLANNING FOR LIQUIDITY IN SAVINGS AND LOAN ASSOCIATIONS,
by A. charnes and Sten Thore. May 64, 60p
ONR-RM-95
Contract Nonr1228 10, Proj. NRO47 021
Unclassified report

Descriptors: (*Economics, Mathematical models), (*Banking, Mathematical models), Management engineering, Costs, Budgets, Money, Equations, Linear programming, Probability, Stochastic processes, Management planning, Mathematical prediction.

The present paper shows an application of the method of chance-constrained programming to a case of financial planning. It is felt that this new method of programming will in the future turn out to be helpful in analyzing a wide range of problems in the field of financial budgeting and the costing of funds for corporations and financial institutions. Indeed, the method of chance-constrained programming was explicitly developed to take care of the following two fundamental aspects of planning, both of which are characteristic of the setting of the problem in financial budgeting: (a) there are usually and typically present a large number of constraints, institutional, subjective or otherwise; and (b) the problem is one of planning in the face of an uncertain future, the chance elements entering both the object function to be optimized and the constraints. (Author)

AD-606 969 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
REVIEW OF TWO BOOKS ON ECONOMIC DEVELOPMENT,
by George Rosen. Oct 64, 6p P-2990
Unclassified report

Edited by P. N. Rosenstein-Rodan - 'Capital Formation and Economic Development' (p. 164) and 'Pricing and Fiscal Policies (p. 216) Allen and Unwin, LTD., London, 1964.

Descriptors: (*Economics, Reviews), India, Government (Foreign), Leadership, Money, Consumption, Decision making.

These are the second and third books in the Allen and Unwin series which publishes work being carried on by the Massachusetts Institute of Technology Center for International Studies in India. These books arise more or less directly out of the economic research conducted by the Center, in conjunction with various Indian research organizations and in close cooperation with the Indian Planning Commission. The Capital Formation volume is essentially a collection of papers on macro-economic problems, centering around the theoretical bases of some of the Indian models used in preparing the Third Five-Year Plan; and presenting a theoretical formulation for the construction of alternative models for later plan exercises. The papers in the Pricing volume discusses specific issues of planning -- such as sectoral pricing policies, fiscal policies, the conflict among plan objectives--in India. A major theme underlying both these volumes in the clarification of the contribution that the economist, as economist, can make to the problems of development in a particular country.

AD-607 003 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COSTS AND OUTPUTS,
by Armen Alchian. 3 Sep 58, 30p P-1449
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Economics, Theory), Costs, Mathematical models, Statistical functions, Money, Equations, Production, Mathematical analysis.

Obscurities, ambiguities and errors exist in cost and supply analysis despite, or because of, the immense literature on the subject. Especially obscure are the relationships between cost and output both in the long run and in the short run. Propositions designed to eliminate some of these ambiguities and errors are presented in this paper. More important, these suggested propositions seem to be empirically valid. (Author)

AD-607 005 Div. 32
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INDONESIAN IMAGES OF THEIR NATIONAL SELF,
by Guy J. Pauker. 1 Aug 58, 57p P-1452-RC
Unclassified report

Prepared for publication in Public Opinion Quarterly, Nov 58.

Descriptors: (*Indonesia, Public opinion), (*Public opinion, Indonesia), Government (Foreign), Population, Leadership, Culture, Language, Economics, Social sciences, Political science, Attitudes.

The report discusses the Indonesian self-image as reflected by the various responses of the Indonesian people to the following question: 'What is our goal and our mission in this world, taking into account our specific characteristics, our history, the culture of our people and also our vision of the future.'

AD-607 008 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A RATIONAL ECONOMIC MODEL APPROACH TO THE BIRTH RATE,
by Bernard Okun. 12 Aug 58, 13p P-1458
Unclassified report

Descriptors: (*Economics, Birth), (*Birth, Economics), Mathematical models, Statistical processes, Fertility, Children, Factor analysis, Costs, Money.

This paper focuses attention on an economic explanation of the birth rate. Although abstracting from many social, psychological and economic hypotheses which have been adduced as explanations of birth rate trends, there is no intention to convey the idea that only the factors which it considers in the analysis are of significance. It is well known that in the developed countries, the secular trend in the birth rate has been downward during the past 100 years. This has occurred in the face of rising average family income. In this paper an economic model is proposed which suggests that the rise in family income contributed to the decline in family size.

by Richard H. Moorsteen. 24 Oct 58, 10p P-1397
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Economics, USSR), (*Industrial production, USSR), (*USSR, Industrial production), Industries, Costs, Labor, Money, Machine tools, Reviews.

Professor Granick has asked 'whether the observed technological decisions (in the Soviet Union) seem similar to those which might have been expected from the workings of economic calculation, provided that such calculation was based on prices appropriate to relative factor scarcities in the economy and to demand schedules reflective of the desires of those exercising effective demand...' He adduces several pieces of evidence, each of which is interpreted as indicating an affirmative answer to the question. The separate pieces of evidence are commented on, taking issue in some ways with the interpretations placed on them, and also on the implications of the opening question itself.

AD-606 933 Div. 32
OTS Prices: HC $1.00/MF$0.50

RAND Corp., Santa Monica, Calif.
COMMENTS ON WILES' 'RATIONALITY, THE MARKET, DECENTRALIZATION AND THE TERRITORIAL PRINCIPLE,'
by Norman M. Kaplan. 7 Jul 58, 12p P-1398
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Economics, Theory), Sociology, Social sciences, Industrial production, Consumption, Decision making, Management engineering, Reviews.

Wiles paper has two main parts: a theoretical part on rationality and resource allocation, and a slightly more factual part on the recent reorganization of the Soviet economy. The nexus between them appears to be negative; the point seems to be that the reorganization does not represent the kind of reform which economic rationality would suggest. In any case, the remarks of this review are confined to the theory of resource allocation under 'socialism' in part because the reorganization of the Soviet economy is covered in the remarks of others.

AD-606 934 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DISENGAGEMENT,
by Hans Speier. 18 Nov 58, 12p P-1400
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Foreign policy, United States government), (*United States government, Cold war), (*Cold war, Foreign policy), Political science, Deterrence, Defense systems, Nuclear weapons, Armed forces (Foreign), Launching sites.

The crisis of Western security has political as well as military aspects. Disengagement is a term now frequently used to designate certain proposals for change in American foreign policy, so that we can overcome the crisis. The current political proposals for disengagement are not -- or not yet -- based on the premise that the West is forced to retreat. Instead, they are predicated on certain estimates of present and future Soviet intentions and on the fear of accidental war.

AD-606 941 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
BROKEN GEMS AND WHOLE TILES: A REVIEW ARTICLE,
by A. M. Halpern. 8 Aug 58, 12p P-1419, rev.
Unclassified report

Review of monos. Control of Japanese Foreign Policy: A study of Civil-Military Rivalry, 1930-45 by Y. C. Maxon, Berkeley, 1957 and The United States and Japan, rev. ed., by E. O. Reischauer, Cambridge, 1957. Prepared for publication in World Politics, n. d.

Descriptors: (*Political science, Japan), (*Japan, Political science), Social sciences, Government (Foreign), Leadership, History, Culture, Armed forces (Foreign), Reviews.

The two books under review here exemplify, each in its own way, the prosperous state that Japanology has attained in this country. Maxon adds his name to the already respectably long list of American students whose grasp of sources is both broad and deep, who have worked directly with Japanese individuals and institutions as well as contemplated them, and who furthermore have a point to make. Maxon's book is a closely documented monograph. The revised edition of Reischauer's book contains some changes and a new section covering postwar trends. Reischauer in this book is not so much the monographist as the practitioner of humane letters, whose grasp of the facts is so sure and comprehensive that he can proceed to consider their meaning without pausing for exhaustive description. Both men exhibit the historian's bent. Since the reviewer is predisposed to a sociological approach, the questions asked of the books refer to the explanatory concepts used by the authors and to how much these concepts explain or leave unexplained.

AD-606 947 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
REVIEW OF OEEC, SOME ASPECTS OF THE EUROPEAN ENERGY PROBLEM AND OEEC, EUROPE'S GROWING NEEDS OF ENERGY: HOW CAN THEY BE MET,
by Harold Lubell. 28 Jul 58, 6p P-1445
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Europe, Economics), (*Economics, Europe), (*Power supplies, Europe), Energy, Nuclear energy, Nuclear industrial applications, Power plants (Establishments), Industries, Consumption, Costs, Reviews.

The basic contributions of the Organization for European Economic Cooperation to the discussions of Western Europe's growing shortage of energy resources that preceded the birth of Euratom are contained in two documents. The earlier, Some Aspects of the European Energy Problem, was written in 1955 by Louis Armand, one of the 'Three Wise Men' who later outlined a set of goals for a future European nuclear energy community. At Armand's suggestion, his brief survey was followed up by a more extensive study of Europe's situation, Europe's Growing Needs of Energy: How Can They Be Met, written in 1956 by a group of experts which included Francesco Giordani, another of the 'Three Wise Men', and eight other of the leading experts of Continental Europe, the

Descriptors: (*Economics, Theory), Commerce, Costs, Industrial production, Consumption.

This paper discusses the following: (1) In the world envisaged by present customs union theory, trade diversion cannot raise welfare. Lipsey's contrary conclusion follows from confusing the effects of two separate policy changes. (2) Second-best is irrelevant in analyzing the welfare effects of a customs union. (3) Although trade creation may (in the Vinerian world) result in a rise in welfare, a country can always do even better by an appropriate policy of non-preferential protection. Although Viner would presumably concur, because he regards free trade (a limiting case of nonpreferential protection) as the best of all worlds, our conclusion follows even if one regards protection as sound policy. (4) Once one leaves the Vinerian world, greater opportunities for gain may be provided by a customs union than by nonpreferential protection; but these opportunities cannot be dealt with in the customary framework developed by Viner and subsequent customs theorists.

AD-607 194 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
RESUME OF THE RAND CONFERENCE ON URBAN ECONOMICS,
by J. H. Niedercorn and A. H. Pascal.
Oct 64, 35p P-2991
Unclassified report

Descriptors: (*Urban planning, Symposia), (*Economics, Urban areas), (*Urban areas, Economics), Social sciences, Transportation, Population, Housing, Standards, Industries, Labor.

The Conference on Urban Economics was held August 24 and 25, 1964, at The RAND Corporation in Santa Monica. This conclave, which brought together public officials and members of the research community, had three major objectives: stimulation of scholarly interest in urban problem areas, evaluation of the potentialities for application of past and current research findings to policy questions, and exploration of the demand for research which might be generated by impending public decisions in this field.

AD-607 264 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOVIET BANKS AND BANKERS,
by Egon Neuberger. Sep 64, 33p P-2980
Unclassified report

Prepared for publication in The Bankers Magazine, n.d.

Descriptors: (*Banking, USSR), (*USSR, Banking), Economics, Government (Foreign), Money, Commerce, Budgets, Consumption.

A brief description of the organization of the Soviet banking system and the functions performed by it, as well as some glimpses of the role which Soviet bankers play in the economy of the Soviet Union are presented. The history of the Soviet banking system is not reviewed since a description of the present system is likely to be of greater interest than is a recapitulation of the changes that have taken place in the almost 50 years since the 1917 advent to power of the Soviet regime. It should be noted, however, that of all the sectors of the Soviet economy the banking system, despite many reorganizations and shifts in functions, has been one of those least subject to basic changes.

AD-607 266 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A STRATEGY FOR DECISION: A REVIEW,
by Paul Y. Hammond. Oct 64, 11p P-2994
Unclassified report

Descriptors: (*Decision making, Reviews), (*Social sciences, Decision making), Political science, Leadership, Behavior, Theory.

The value of the book being reviewed is in illuminating the rationale of decisionmaking as it occurs in the real world. In effect the authors are arguing, much as the classical economist has argued about the economic system, that things are more rational than they seem to be. The focus of the book is on what the authors call policymaking. They have set social action and choice in the context of a viable political or social community in which people talk with each other, exchange opinions, and criticize each other, and in which cognition, decision, and action are coped with and made more manageable by the division of labor and by a pragmatic concentration on how things can be made different.

AD-607 301 Div. 32, 23
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
WHAT WE BRING ON THE WAY,
by B. Dzhumasheva and A. Kireev. 23 Sep 64, 10p
FTD TT64 677; TT 64 71567
Unclassified report

Unedited rough draft trans. from Izvestiya (USSR) 1963, 28 Sep.

Descriptors: (*Communism, Education), (*Education, Communism), Children, History, Communists, Population, Propaganda.

AD-607 360 Div. 32, 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE GREAT STATISTICS OF WARS 'HOAX',
by Brownlee Haydon. Nov 62, 9p P-2661
Unclassified report

Descriptors: (*Articles, Warfare), (*Warfare, Statistical data), Periodicals, Newspapers, Documentation.

An article on the statistics of wars throughout the ages, which has appeared in various articles in several different countries, is exposed as a fantasy.

AD-607 376 Div. 32
OTS Prices: HC $3.00/MF $0.75

Center for the Information Sciences, Lehigh Univ., Bethlehem, Pa.
ENGLISH CANONICAL FORMS AND STYLE LEVELS,
by A. F. Brown. Sep 64, 65p
AFOSR 64 1866
Unclassified report

Supported in part by Grant AF AFOSR477 64, Pennsylvania Univ., Philadelphia.

Descriptors: (*Language, Analysis), (*Vocabular, Speech representation), History, Speech, Social sciences.

Division 32 - MISCELLANEOUS ARTS AND SCIENCES

AD-607 020 Div. 32, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A MATHEMATICAL STUDY OF ARBITRAGE,
by Jeremy J. Stone and Harvey M. Wagner. 2 Sep 58, 45p P-1478
Unclassified report

Descriptors: (*Commerce, Money), (*Money, Commerce), Economics, Stability, Mathematical models, Linear programming.

This paper is a systematic study of the mathematical structure underlying nearly perfect exchange markets which are spatially or temporally separated. The principal questions investigated are 'what are equilibrium conditions for a set of exchange rates' and 'How can arbitrage possibilities be discovered, if they exist.' The analysis involves the combined use of an algebraic representation, which is conducive to the derivation of qualitative features characterizing a multi-exchange market; and two linear programming models, one of which has use in establishing a desirable set of equilibrium exchange rates, and the other of which has a special form permitting an efficient computational scheme for discovering arbitrage possibilities. (Author)

AD-607 021 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NOTE ON THE RELATIONSHIP OF SAVING TO THE RATE OF INTEREST, REAL INCOME, AND EXPECTED FUTURE PRICES,
by Donald V. T. Bear. 4 Sep 58, 40p P-1480
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Money, Economics), (*Budgets, Correlation techniques), Wages, Costs.

AD-607 142 Div. 32
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE COMMUNISM BUILDUP AND THE SOCIAL SCIENCES,
by M. V. Keldysh. 18 Sep 64, 9p
FTD TT64 405; TT 64 71535
Unclassified report

Unedited rough draft trans. of Priroda (USSR) 1962, v. 51, no. 11, p. 3-4.

Descriptors: (*Communism, Social sciences), (*Social sciences, USSR), Government (Foreign), Propaganda, Scientific research.

The general meeting of the Academy of Sciences of the USSR, held on the 19th and 20th of October of 1962 in Moscow, was devoted to problems in the development of the social sciences and conditions of unfolding buildup of communism. It was said that, the twenty-second session and the Party program raise the theory of scientific communism to a new level. The highest mission and main task of the activities of Soviet science, it was said, are actively to participate in the creation of a new society and to aid the Party in the creative development and propaganda of Marxian-Leninian science, the vital basis of the Soviet structure.

AD-607 162 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
RUSSIAN TRANSLITERATION -- SOUND AND SENSE,
by Rosemary Neiswender. Nov 61, 9p P-2491
Unclassified report

Descriptors: (*Language, USSR), (*Speech representation, Standardization), Libraries, Social communication, Vocabulary.

The transliteration into the Roman alphabet of languages with a non-Roman script is often dismissed, even by librarians, as a rather academic problem--one best left to philologists. To the lay rader, 'Tschaikowsky,' 'Chekhov,' and 'Khrushchev' seem to be spelled in the obvious and only possible manner, and it is something of a puzzlement to encounter in a bibliographic citation or a library catalog the equally defensible versions, 'Chaikovskii,' 'Tschechoff,' and 'Hruscev.' These randomly chosen but fairly representative examples illustrate graphically the predicament of the researcher attempting to verify Slavic names and titles referenced in foreign (and many American) publications, and equally demonstrate the need for a universally-accepted system of Russian transliteration.

AD-607 186 Div. 32
OTS Prices: HC $6.00/MF $1.25

RAND Corp., Santa Monica, Calif.
PARIS FROM EDC TO WEU,
by Nathan Leites and Christian de la Malene.
1 Mar 56, 210p RM-1668-RC
Unclassified report

Pages xiv, 30, 142, and 180 are apparently blank and for that reason were omitted from the document.

Descriptors: (*France, Foreign policy), (*Political science, France), (*West Germany, Armament), Government (Foreign), Western Europe, Military organizations, Defense systems, Armed forces (Foreign), Leadership, History.

This study attempts to throw light on the attitudes of French parliamentarians (the Communists excepted) toward the rearmament of Germany -- attitudes that came particularly to the fore during the year that preceded the French ratification of WEU in March, 1955. That year included the rejection of EDC in the summer of 1954, the acceptance of the London Agreements in the fall, and the difficult passage of the Paris Agreements through the National Assembly during the winter. The study does not discuss the frequently hidden and always important influence that was exerted by considerations of economic interest and of domestic policy. It only tries to clarify some of the major attitudes on the manifest problems of French foreign policy that were aroused by the various schemes for German rearmament. It would seem that these attitudes have not always been sufficiently understood. (Author)

AD-607 192 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NEW LOOK AT CUSTOMS UNION THEORY,
by C. A. Cooper and B. F. Massell. Oct 64, 11p P-2972
Unclassified report

33. Transportation

AD-606 904 Div. 33, 13, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A MARGINAL COST FUNCTION FOR HIGHWAY CONSTRUCTION AND OPERATION,
by Allen R. Ferguson. 30 Dec 57, 34p P-1347
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Roads, Costs), (*Civil engineering, Roads), Transportation, Traffic, Budgets, Management engineering.

The purpose of this study is to develop a cost function adequate for assigning highway costs to various classes of vehicles. Costs are defined merely as expenditures of the Highway Department in the construction and operation of the highway system. The study was originally prepared in 1953 for the Virginia Highway Users Association in connection with legislative hearings on highway taxation in the State of Virginia. The data used are fiscal 1952 data for the State. Consequently the numerical results are of little general interest, except as a means of illustrating the method.

AD-607 247 Div. 33, 1, 2, 19
OTS Prices: HC $3.00/MF $0.75

American Inst. for Research, Pittsburgh, Pa.
PILOT-TO-FORECASTER SERVICE.
Final evaluation rept.,
by George R. Purifoy, Jr. and Janice A. Schaeffer.
Jun 64, 99p
Contract FAA BRD366
FAA RD64 109
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. Also see AD-602 839.

Descriptors: (*Weather forecasting, Aviation safety), (*Air traffic control systems, Weather communications), (*Aviation safety, Weather forecasting), Pilots, Civil aviation, Terminal flight facilities, Communication equipment, All-weather aviation, Intercommunication systems.

The Pilot-to-Forecaster Service (PTFS) test was designed to examine a weather support concept of direct radio access by civil pilots to an aviation forecaster. Three separate configurations were evaluated to determine their effectiveness in providing weather information support to aviation and air traffic control: (1) PTFS co-located with an ARTC center and having multiple discrete frequency remote transmitter-receiver outlets, (2) PTFS co-located with a Weather Bureau FAWS and having a single discrete frequency transmitter-receiver outlet, and (3) phone-patch communications between PTFS and multiple Flight Service Stations (FSS). In general, the evaluation findings were that: PTFS, in any of its tested configurations, was a highly effective component of the aviation weather system; Discrete frequency operation was superior to phone-patch operation; and, PTFS co-located with the ARTC center provided a greater amount of useful weather support to the process of air traffic control than did PTFS co-located with the FAWS.

AD-607 331 Div. 33, 13, 14
OTS Prices: HC $7.25/MF $2.00

Soil Testing Services, Inc., Northbrook, Ill.
THICKNESS DESIGN PROCEDURE FOR AIRFIELDS CONTAINING STABILIZED PAVEMENT COMPONENTS.
Final rept.,
by Robert G. Lukas, Clyde N. Baker, Jr., and John P. Gnaedinger. Sep 64, 423p
Contract ARDS486, Proj. 413 1D
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Landing fields, Pavements), (*Pavements, Landing fields), Soil mechanics, Thickness, Specifications, Stabilization, Hardness, Plasticity, Mechanical properties, Flexible structures, Materials, Cements, Design.

An investigation was conducted to determine the manner and extent to which stabilized materials can be utilized in airport pavement components which include the subgrade, subbase, and base courses. The investigation was primarily limited to a review of existing knowledge of soil stabilization and pavement thickness design practices. Some additional research was necessary to provide additional data where information from published sources was lacking or sparse. Recommendations are advanced in regard to thickness design and quality requirements when stabilized materials are incorporated into the pavement. An attempt was made to duplicate the existing FAA design criteria as much as possible thereby resulting in a minimum amount of change. Basically, this objective was accomplished in that the required pavement thickness is still determined by the present curves for flexible and rigid pavements and the thickness is then adjusted in certain cases to account for the stabilized component. It was necessary to introduce a bearing strength test (unconfined compression test) for the higher levels of stabilization to rate the effectiveness of the stabilizing agents in producing pavement components of sufficient quality.

In an effort to characterize different levels of style in spoken and written English, one element of style - the lexical material - is examined. There appears to be a general association of borrowed lexical material with formal styles, and of native lexical material with informal styles. Also, there is evidence that, while some proportion of loan forms have been well-naturalized into native English shapes and may be not distinguishable as loans, a large number of loan forms still have shapes which set them off from native forms. Some proper names and verb forms are examined as samples of the lexical material. The relation of variants of some proper names to levels of style is discussed, as well as the relation of native versus loan verbs to levels of style. Both forestressing and syllabic-morphemic matching appear to be characteristic of native canonical forms and familiar style levels, and, conversely post-stressing and nonmatching are characteristic of loan forms and formal styles. (Author)

AD-607 396 Div. 32
OTS Prices: HC $2.00/MF $0.50

Itek Corp., Waltham, Mass.
APPLICATION OF THE GALOIS CONNECTION TO INFORMATION SYSTEMS.
Final rept.,
by R. F. Barnes and R. W. Robinson. 15 Sep 64, 31p
Itek-9078-1
Contract AF49 638 I229
AFOSR 64 1868

Unclassified report

Descriptors: (*Documentation, Mathematical models), (*Mathematical models, Documentation), Libraries, Indexes, Subject indexing, Graphics, Transformations (Mathematics), Iterative methods, Differential equations, Word association, Set theory.

The authors inquiry into the quantitative aspects of the concepts of similarity as applied to a simple variety of library systems led to the consideration of a large family of association schemes. Each scheme was uniquely determined by a particular transformation function--a map from the set of similarity coefficients for terms (or documents) to the set of similarity coefficients for documents (or terms). The transformations considered preserve the property of nonnegativity for sets of similarity coefficients, which allows one to show that there is a set of coefficients left fixed by any chosen transformation. This set of coefficients depends on the chosen transformation and represents exactly the degree of association demanded by consistency with the chosen transformation. Thus, for any transformation one arrives at a set of similarity coefficients which corresponds to it. An iterative method was advanced for the computation of our fixed set of similarity coefficients, and the particular analytic questions remaining center upon this method. It has not been shown that the iteration always converges, though experience indicates that convergence is the rule. If the iteration converges at all, it converges to a fixed point as desired. Experience further indicates that the fixed point obtained is independent of the starting set of coefficients, provided these coefficients are nonnegative, except possibly on a set of measure zero.

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NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are included in the subject index.

1. Aircraft and Flight Equipment

AD-413 312 Div. 1, 12, 14
OTS Prices: HC $5.00/MF $1.00

Bendix Corp., Southfield, Mich.
ELECTRICAL STRAIN PRODUCERS IN FLIGHT CONTROL APPLICATIONS.
Final rept.,
by C. S. Chang and S. K. T. Hsu. May 63, 186p
Contract AF33 657 8274, Proj. 8225, Task 822504
ASD TDR63 538

Unclassified report

Descriptors: (*Magnetostrictive elements, Flight control systems), (*Flight control systems, Magnetostrictive elements), (*Synchros, Materials), Actuators, Piezoelectric crystals, Electrical properties, Ceramic materials, Strain (Mechanics), Magnetostriction, Control systems, Feasibility studies, Models (Simulations), Reviews, Spacecraft, Mathematical analysis.

An investigation of electrical strain producing materials in flight control applications is described. Magnetostrictive material properties were investigated, with data obtained through a literature survey and through experiments. Commercial piezoelectric ceramic properties were used to evaluate their applicabilities in flight control and to design physical models for feasibility study. The characteristics of flight control systems and components are discussed to determine where electrical strain producers may be most advantageously employed. Several flight control components based on strain producers were conceived and analyzed. Models were designed, constructed and experimentally evaluated to demonstrate the feasibility of strain producers in several configurations. These were a high response disc valve, a torque motor, and a linear actuator. (Author)

2. Astronomy, Geophysics and Geography

AD-402 229 Div. 2, 30, 31
OTS Prices: HC $2.00/MF $0.50

Committee on Oceanography, NAS-NRC, Washington, D. C.
OCEANOGRAPHY 1960 TO 1970. CHAPTER 1. INTRODUCTION AND SUMMARY OF RECOMMENDATIONS.
1959, 48p

Unclassified report

Descriptors: (*Oceanology, Research program administration), (*Research program administration, Oceanology), Education, Personnel, Oceanographic vessels, Hydrographic surveying, Artificial radioactivity, Marine biology, Marine geology, Budgets.

Contents:
Introduction
General Recommendations
Specific Recommendations
Education and Manpower
New Ships
Shore Facilities for Basic Research
Ocean-Wide Surveys
Engineering Needs
Radioactivity
Ocean Resources
International Cooperation
Budget and Operations
Membership of Panels.

AD-402 230 Div. 2
OTS Prices: HC $2.00/MF $0.50

Committee on Oceanography, NAS-NRC, Washington, D. C.
OCEANOGRAPHY 1960 TO 1970. CHAPTER 2. BASIC RESEARCH IN OCEANOGRAPHY DURING THE NEXT TEN YEARS.
1959, 30p

Unclassified report

See also AD-402 229.

Descriptors: (*Oceanology, Scientific research), Marine biology, Marine geophysics, Research program administration, Estuaries, Oceanographic equipment, Budgets.

Contents:
Introduction
Conditions Necessary for Basic Research in the Marine Sciences
Fields of Basic Research in Oceanography
History of the Oceans
The Ways of Life in the Sea
The Motions of the Waters
Ocean-Atmosphere Relationships
Estuaries and Coastal Waters
An Example of the Application of Basic Research--Forecasting Oceanographic Parameters
The Financial Support for Basic Research

AD-402 231 Div. 2, 32
OTS Prices: HC $2.00/MF $0.50

Committee on Oceanography, NAS-NRC, Washington, D. C.
OCEANOGRAPHY 1960 TO 1970. CHAPTER 3. OCEAN RESOURCES.
1959, 42p

Unclassified report

See also AD-402 230.

Descriptors: (*Oceanology, Economics), (*Economics, Oceanology), Marine biology, Marine geology, Research program administration, Budgets.

This report deals only with biological and mineral resources and their problems, not with the possibilities of extracting fresh water from the sea, or of generating power from tidal action. It is arranged in two parts: I, a general introductory discussion on biological and mineral resources and the problems concerned with these resources; II, an itemization of recommendations and the estimated costs of putting them into effect.

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Physical and Chemical Features
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Estimated Shiptime and Manpower Needed
Recommended Program for the United States
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Biological Surveys

AD-402 238 Div. 2, 18, 30
OTS Prices: HC $1.00/MF $0.50

Committee on Oceanography, NAS-NRC, Washington, D. C.
OCEANOGRAPHY 1960 TO 1970. CHAPTER 10. INTERNATIONAL COOPERATION.
1959, 16p
Unclassified report

See also AD-402 237.

Descriptors: (*Oceanology, Research program administration), (*Research program administration, Oceanology), Marine biology, Artificial radioactivity, Minerals, Naval operations, Submarines, Scientific organizations, Government (Foreign).

Contents:
Introduction
Discussion
Fisheries
Radioactivity in the Oceans
Mineral Resources
Submarine Operations
Methods
Recommendations

AD-402 239 Div. 2
OTS Prices: HC $2.00/MF $0.50

Committee on Oceanography, NAS-NRC, Washington, D. C.
OCEANOGRAPHY 1960 TO 1970. CHAPTER 11. A HISTORY OF OCEANOGRAPHY: A BRIEF ACCOUNT OF THE DEVELOPMENT OF OCEANOGRAPHY IN THE UNITED STATES.
1962, 36p
Unclassified report

See also AD-402 238.

Descriptors: (*Oceanology, Reviews), Scientific personnel, Periodicals, United States Government, Universities.

Contents:
Introduction
Early Pioneers
Early Oceanographic Exploration
Atlases and Technical Journals
Deep Ocean Biological Collections
Coastal Fisheries
New Approaches and Broadened Interests
Oceanography in the U. S. Government
The Navy
The Bureau of Commercial Fisheries
The Coast and Geodetic Survey
The Geological Survey
The United States Coast Guard
The National Science Foundation
The Atomic Energy Commission
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The National Oceanographic Data Center
The Congress
General Views
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Postwar Growth
Future Growth and Basic Research
Appendix A. Other References in the History of Oceanography
Appendix B. U. S. Marine Laboratories.

AD-402 240 Div. 2, 30
OTS Prices: HC $1.00/MF $0.50

Committee on Ocenography, NAS-NRC, Washington, D. C.
OCEANOGRAPHY 1960 TO 1970: CHAPTER 12. MARINE SCIENCES IN THE UNITED STATES, 1958.
1959, 16p
Unclassified report

See also AD-402 239.

Descriptors: (*Oceanology, Reviews), Scientific personnel, United States Government, Laboratories, Budgets.

Contents:
Introduction, Financial Support, Personnel Engaged in Oceanographic Work, Government Laboratories, Comparison of Laboratories, Growth of Oceanography.

AD-424 961 Div. 2, 25, 30
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
SEISMIC MODEL IMPACTER,
Instrumentation for Geophysics and Astrophysics research note,
by Ker C. Thomson and John A. Hill. Nov 63, 28p
Proj. 8652, Task 865210
AFCRL 63 790; AFCRL IP27
Unclassified report

Descriptors: (*Seismic waves, Models (Simulations), (*Photoelasticity, Seismology), Impact shock, Earth models, Mechanical waves, Soil mechanics, Measurement, Optical instruments, Geophysics.

A new type of strobo-photoelastic impact source is described in detail, including specifications, design, and operation. This equipment extends the model size available, for photoelastic studies of propagating waves, from models having linear dimensions of an inch or two to models more than a foot square. The seismic model impacter unit supplies a 1/8 inch deflection, within a time of 1 millisec, to the model material. This impact is repeated precisely 30 times per second. (Author)

AD-441 353 Div. 2
OTS Prices: HC $1.00/MF $0.50

Chicago Univ., Ill.
THE FORMATION OF H II REGIONS. IV.
Technical rept. no. 2,
by Peter O. Vandervoort. 3 Oct 63, 12p
Grant Nonr G0008 63, Proj. NR046 794
Unclassified report

Report on Theoretical Investigations of the Expansion of H II Regions, pub. in The Astrophysical Journal 1964, v. 139, no. 3, Apr, p. 889-898. See also AD-441 354.

Descriptors: (*Stars, Gas ionization), (*Gas ionization, Stars), Mathematical models, Interstellar matter, Hydrogen, Gases, Ionization, Recombination reactions, Electrons, Protons, Astrophysics.

AD-402 232 Div. 2, 18
OTS Prices: HC $2.00/MF $0.50

Committee on Oceanography, NAS-NRC, Washington, D. C.
OCEANOGRAPHY 1960 TO 1970. CHAPTER 4. OCEANOGRAPHIC RESEARCH FOR DEFENSE APPLICATIONS.
1960, 26p

Unclassified report

See also AD-402 231.

Descriptors: (*Oceanology, Military requirements), (*Naval research, Oceanology), Oceanographic equipment, Personnel, Budgets, Armed forces operations.

Contents:
Introduction
Naval Oceanography During World War II
Navy Uses of Oceanographic Information
Obtaining the Needed Information
Future Prospects
Recommendations
Summary
Appendix: Summary of Navy Recommendations from Chapter I
Summary of Recommended Navy Support - Table.

AD-402 233 Div. 2, 18, 20
OTS Prices: HC $2.00/MF $0.50

Committee on Oceanography, NAS-NRC, Washington, D. C.
OCEANOGRAPHY 1960 TO 1970. CHAPTER 5. ARTIFICIAL RADIOACTIVITY IN THE MARINE ENVIRONMENT.
1959, 40p

Unclassified report

See also AD-402 232.

Descriptors: (*Oceanology, Artificial radioactivity), (*Artificial radioactivity, Oceans), (*Radioactive waste, Disposal), Radiation monitors, Radioactive isotopes, Nuclear explosions, Underwater explosions, Radiation effects, Marine biology, Scientific research, Budgets.

Contents:
Control and Monitoring
Research Needs
Coastal and Estuarine Environment
The Open Ocean
Sedimentation Processes
Effects of the Biosphere on the Distribution and Circulation of Radioisotopes in the Sea
Effects of Radiation Upon Marine Organisms
Field Experiments Utilizing Radioisotopes
Possible Effects of a Nuclear War on the Marine Environment
Summary of Budget Estimates.

AD-402 234 Div. 2, 30, 31
OTS Prices: HC $2.00/MF $0.50

Committee on Oceanography, NAS-NRC, Washington, D. C.
OCEANOGRAPHY 1960 TO 1970. CHAPTER 6. NEW RESEARCH SHIPS.
1959, 32p

Unclassified report

See also AD-402 233.

Descriptors: (*Oceanology, Oceanographic vessels), (*Ships, Oceanographic vessels), Marine engineering, Oceanographic equipment, Construction, Scheduling, Specifications, Tables.

Contents:
Introduction
General Recommendations
Ships Required for Marine Science During the Next 10 Years
Schedule of Construction by Agency and Year
Technical Recommendations
Tables.

AD-402 235 Div. 2, 30, 31
OTS Prices: HC $2.00/MF $0.50

Committee on Oceanography, NAS-NRC, Washington, D. C.
OCEANOGRAPHY 1960 TO 1970. CHAPTER 7. ENGINEERING NEEDS FOR OCEAN EXPLORATION.
1959, 32p

Unclassified report

See also AD-402 234.

Descriptors: (*Oceanology, Oceanographic equipment), (*Marine engineering, Oceanographic equipment), Manned, Underwater equipment, Buoys, Aircraft, Hydrographic surveying, Instrumentation, Laboratory equipment, Budgets.

Contents:
Introduction
Deep Manned Vehicles
Large Manned Buoys
Unmanned Buoys
Use of Aircraft in Oceanography
Other Specialized Research Vehicles
Development of New Instruments
Specialized Survey Instruments
High Seas Engineering
Major Laboratory Equipment
Budget Summary and Financing

AD-402 236 Div. 2, 23
OTS Prices: HC $1.00/MF $0.50

Committee on Oceanography, NAS-NRC, Washington, D. C.
OCEANOGRAPHY 1960 TO 1970. CHAPTER 8. EDUCATION AND MANPOWER.
1959, 10p

Unclassified report

See also AD-402 235.

Descriptors: (*Oceanology, Scientific personnel), (*Scientific personnel, Oceanology), Education, Professional personnel, Manpower studies.

AD-402 237 Div. 2
OTS Prices: HC $2.00/MF $0.50

Committee on Oceanography, NAS-NRC, Washington, D. C.
OCEANOGRAPHY 1960 TO 1970 CHAPTER 9. OCEAN-WIDE SURVEYS.
1960, 32p

Unclassified report

See also AD-402 236.

Descriptors: (*Oceanology, Hydrographic surveying), (*Hydrographic surveying, Research program administration), Oceans, Physical properties, Chemical properties, Marine biology, Ocean bottom topography, Marine geology, Navigation, Scientific organizations, Government (Foreign).

Contents:
Introduction
Proposed Program

of gases, purification of atmospheres, anticorrosion, and electrochemistry. For reasons of brevity and because certain areas of application are covered in detail elsewhere, no attempt was made to report exhaustively on every subfield of Soviet research involving adsorption. Particular attention is devoted to Soviet studies on the adsorption of gases on solids, because this is an area under intensive examination by Soviet chemists. Soviet progress in fundamental and applied adsorption research since 1960, with emphasis on advanced theoretical developments and major applied research programs which have direct or indirect scientific, industrial, or military significance is the concern of this report. Published Soviet technical literature from 1960 through 1963 forms the basis of the report. Research before 1960 is discussed only for background purposes.

PB-166 215 Div. 4, 14
OTS Prices: HC $3.00/MF $0.75

RECENT SOVIET RESEARCH IN THE USE OF IONIZING RADIATION IN ORGANIC SYNTHESIS AND HIGH POLYMERS.
Oct 64, 91p PAL-64-7

Unclassified report

Descriptors: (*Radiation chemistry, Reviews), (*Organic compounds, Radiation chemistry), (*Polymers, Radiation chemistry), Oxidation, Halogenation, Hydrocarbons, Synthesis (Chemistry), Degradation, Rubber, Polyethylene plastics, Semiconductors, Polymerization, Radioactive isotopes, Particle accelerators, Scientific personnel, Radiochemistry laboratories, Bibliographies, USSR.

Contents: oxidation reactions, Halogenation reactions, radiolysis of hydrocarbons, radiation chemistry of multicomponent systems, miscellaneous syntheses, miscellaneous degradation studies, action of ionizing radiation on high polymers (Rubber, Polyethylene, Miscellaneous Polymers, Preparation of Semi-conducting Polymers), radiation induced polymerization, graft polymerization, radiation sources used for radiation chemistry, Soviet scientists and institutions engaged in the radiation chemistry of organic and high molecular weight compounds.

PB-166 238 Div. 4
OTS Prices: HC $6.00/MF $1.25

Office of Scientific Research and Development. Div. 11.
MISCELLANEOUS CHEMICAL ENGINEERING PROBLEMS.
Summary technical rept., vol. 2.
1946, declassified 2 Aug 60, 233p
Contract OEMsr1131
AD 221 597

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Chemical engineering), Hydraulic fluids, Fuel tanks, Pyrotechnics, Life rafts, Hydrogen, Markers, Oxygen masks, Flame throwers, Respiration, Sabotage, Sea water, Coatings, Magnesium, Storage batteries, Oils, Shoes, Leather, Gasoline, Moisureproofing, Insects, Military rations, Fuels, Textiles, Films, Plastics.

PB-166 240 Div. 4, 14
OTS Prices: HC $4.00/MF $1.00

SOVIET RESEARCH IN METALLO-ORGANOSILICON CHEMISTRY RELATED TO PLASTICS AND OTHER POLYMERS.
Nov 64, 142p PAL-64-8

Unclassified report

Descriptors: (*Chemistry, Metalorganic compounds), (*Plastics, Chemistry), (*Metalorganic compounds, Silicon compounds), Polymerization, Synthesis (Chemistry), Polymers, Organic compounds, Metals, Organoboranes, Organic sulfur compounds, Organic phosphorus compounds, Organic oxygen compounds, Organic nitrogen compounds, Halogen compounds, Liloxanes, USSR, Scientific research.

This is a report of Soviet chemical research in silicon-organic chemistry comprising polymer and near polymer products containing a chemical element or elements in addition to silicon functional hydrogen, orygen, carbon, and halogen. The report is based upon a study of the Soviet literature published between 1 January 1955 and 1 April 1961. The combination of silicon functional hydrogen, oxygen, carbon, and halogen with certain elements of the periodic grouping of elements forms the substance of this discussion in the following order: Mendeleyev's Periodic System, column one (elements lithium, sodium, potassium); Periodic System, column two (magnesium, cadmium, zinc, barium); Periodic System, column three (boron, aluminum); Periodic System, column four (zirconium, tin, germanium, lead; Titanium; Periodic System, column five (nitrogen, phosphorus, vanadium, antimony); Periodic System, column six (sulpher, chromium, oxygen); Periodic System, column seven (chlorine, bromine, iodine; Fluorine; Periodic System, column eight (iron, cobalt, nickel); Heat Resistant Polymers; Where the data warrant, the discussion covers elastomers, rigid and liquid polymers, free monomers reactions, and miscellaneous. Under 'free monomers' are grouped those compounds which, although theoretically capable of polymerizing, no data are available reporting that they actually have been polymerized.

PB-166 269 Div. 4, 13
OTS Prices: HC $1.00/MF $0.50

Franklin Inst., Philadelphia, Pa.
BIBLIOGRAPHY OF THE LITERATURE ON DROPWISE CONDENSATION 1930-64.
Office of Saline Water Research and development progress rept.,
by R. A. Erb. Aug 64, 14p
Contract 14 01 0001 293
OSW PR119

Unclassified report

Descriptors: (*Condensation, Bibliographies), (*Bibliographies, Condensation), (*Sea water, Desalination), Water, Drops, Heat transfer, Thermodynamics, Evaporators, Salinity, Steam.

This is the one hundred and nineteenth of a series of reports designed to present accounts of progress on saline water conversion with the expectation that the exchange of such data will contribute to the long-range development of economical processes applicable to large-scale, low-cost demineralization of sea and other saline waters. The information herein is submitted as a separate report covering a literature survey on the subject of dropwise condensation.

PB-171 809 (Rev.) Div. 4, 14, 17, 25
OTS Prices: HC $7.00/MF $3.50

Martin Marietta Corp., Denver, Colo.
CRYOGENIC MATERIALS DATA HANDBOOK,
by F. R. Schwartzberg, S. H. Osgood, R. D. Keys, and T. F. Kiefer. Aug 64, 842p
Contract AF33 657 9161, Proj. 7381, Task 738106
ML TDR64 280

Unclassified report

This paper describes a new model for the formation of an H II region about a star of early spectral type that has formed abruptly in an infinite, homogeneous medium of atomic hydrogen. The present model is an improvement over an earlier model in the sense that absorption in the ionized gas of ionizing radiation by hydrogen atoms formed by the recombination of electrons and protons is now taken into account. Generally, when absorption in the ionized gas is important, the problem of the motion of the ionization front forming the boundary of the H II region and the problem of the motion of the ionized gas must be solved simultaneously. It is shown that the two problems can be solved separately in an approximation in which the departures of the density of the ionized gas from the initial density of the neutral gas are neglected in the term describing the effect of absorption in the equation governing the motion of the front. The structure of the H II region when its formation is complete is determined in this approximation for three representative cases, and it is shown that the error involved in this approximation is quite small. (Author)

AD-441 354 Div. 2
OTS Prices: HC $1.00/MF $0.50

Chicago Univ., Ill.
THE FORMATION OF H II REGIONS. III. A MODEL OF THE ORION NEBULA.
Technical rept. no. 1,
by Peter O. Vandervoort. 12 Aug 63, rev. 18 Nov 63, 22p
Grant Nonr G0008 63, Proj. NR046 794
Unclassified report

Report on Theoretical Investigations of the Expansion of H II Regions, pub. in The Astrophysical Journal, 1964, v. 139, no. 3, 1 Apr, p. 869-888.

Descriptors: (*Nebulae, Gas ionization), (*Gas ionization, Nebulae), Galaxies, Stars, Interstellar matter, Hydrogen, Motion, Velocity, Density, Astrophysics, Mathematical models.

A model of the Orion Nebula is described. The initial conditions governing the model are formulated on the basis of our knowledge of the present state of the nebula, and the initial value problem for the motion of the ionized gas is solved by a method similar to the method described earlier. At a certain stage of its evolution the model is in satisfactory agreement with observational results concerning the distributions of the density and the velocity of expansion. On the basis of this agreement it is estimated that the age of the nebula is about 14000-23000 years. (Author)

3. Chemical Warfare Equipment and Materials

No Entries

4. Chemistry

AD-281 236 Div. 4
OTS Prices: HC $1.00/MF $0.50

University Coll., Dublin (Ireland).
THE CONFIGUARATION OF AZULENE DIMOLYBDENUM HEXACORBONYL.
Technical rept. no. 3,
by D. A. Brown and C. M. McMullin. Apr 62, 5p
Contract N62558 2381, Proj. NR051 417
Unclassified report

Descriptors: (*Complex compounds, Molecular isomerism), (*Molybdenum compounds, Complex compounds), (*Terpenes, Complex compounds), Synthesis (Chemistry), Spectra (Visible and ultraviolet), Dipole moments, Dielectric properties, Eire.

The reaction of equimolar quantities of azulene and molybdenum hexacorbonyl in petroleum ether under pure nitrogen yielded deep-red crystals identified as azulene dimolybdenum hexacarbonyl, C10H8Mo2(CO)6. The UV/visible spectrum, dipole moment, and dielectric constant was measured. The results serve to support the postulation that binuclear complexes of azulene tend to prefer the cis arrangement of metal ligand groups.

AD-292 079 Div. 4
OTS Prices: HC $2.00/MF $0.50

General Atomic Div., General Dynamics Corp., San Diego, Calif.
RESEARCH STUDIES ON ANALYSIS OF IONIZED GASES.
Final rept. for 20 Jun 61-31 Jul 62,
by William R. Snow. 31 Jul 62, 26p GA-3358
Contracts DA49 146XZ049, DA49 146XZ041, continuation, Proj. 212
DASA 1329
Unclassified report

Descriptors: (*Gas ionization, Reaction kinetics), (*Reaction kinetics, Gas ionization), Analysis, Charged particles, Linear accelerators, Radiofrequency generators, Mass spectroscopy, Spectrum analyzers, Helium, Hydrogen, Mixtures, Oxygen, Nitrogen, Neon, Water vapor, Carbon dioxide, Scientific research, Laboratory equipment, Design.

This paper presents the results of a study of reaction kinetics of some ionized gases and gas mixtures. It also includes a detail discussion of the laboratory equipment used for the research.

AD-442 440 Div. 4
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SOURCE OF PROTONS WITH THERMAL DISSOCIATION OF HYDROGEN MOLECULES,
by M. D. Gabovich and Z. P. Fedorus. 10 Jun 64, 14p
FTD TT64 522; TT 64 71189
Unclassified report

Unedited rough draft trans. of Ukrayins'kyi Fizychnyi Zhurnal (USSR) 1956, v. 1, no. 2, p. 158-169.

Descriptors: (*Protons, Sources), (*Hydrogen, Dissociation), Ion beams, Molecules, Ions.

PB-166 214 Div. 4
OTS Prices: HC $1.00/MF $0.50

SOVIET RESEARCH IN ADSORPTION PHENOMENA.
Oct 64, 15p PAL-64-6
Unclassified report

Descriptors: (*Adsorption, Scientific research), Catalysis, Gases, Corrosion, Electrochemistry, Solids, USSR.

Adsorption phenomena are involved in a great many chemical processes, including heterogeneous catalysis, separation

time. OXYGEN ELECTRODE: The behavior of activated, wet-proofed, porous carbon as an oxygen electrode in acidic and alkaline media in the presence of various catalysts was investigated. Open circuit voltage of 1.2 volts (which is close to the theoretical value of 1.25V at 25C) was obtained with platinized carbon as the oxygen electrode in alkaline media. In the acidic media, the catalysts were apparently ineffective.

PB-166 220 Div. 7, 4
OTS Prices: HC $3.00/MF $0.75

General Electric Co., West Lynn, Mass.
RESEARCH ON LOW TEMPERATURE FUEL CELL SYSTEMS.
Progress rept. no. 11, 15 Apr-15 Jun 60.
15 Jun 60, 72p
Contract DA44 009ENG3771
AD 246 736

Unclassified report

Descriptors: (*Fuel cells, Low-temperature research), (*Power supplies, Electrochemistry), (*Electrodes, Fuel cells), Energy conversion, Hydrocarbons, Porous materials, Halocarbon plastics, Membranes, Semipermeability, Polarization, Ion exchange, Catalysts, Electrolytes.

The development of practical electrode structure was continued with the work taking two paths. Porous plastics, e.g., polyethylene and Teflon, loaded with catalyst powders were investigated. Hydrogen-oxygen caustic electrolyte cells using platinum metal in Teflon electrodes show excellent performance giving about 100 mA/sq cm at 0.7 volts. A second structure investigated is the pasted screen electrode. Here catalyst powders are pasted on to a conducting metal screen. Electrodes were fabricated from platinum, palladium, silver, reduced silver oxide and predigested Raney nickel. Platinum metal cells perform well on hydrogen and oxygen. Some preliminary results of operation on non-hydrogen fuels were obtained. The work on oxygen electrode polarization for the fuel cells was started. The polarization cells and the interruptor circuit design for the polarization studies are described. Preliminary polarization data with bright and platinized platinum electrodes as a function of pH are presented. Some data concerning the behavior of the oxygen electrode of the ion-exchange membrane fuel cells are also given. Investigations are underway using different catalysts and electrode materials. (Author)

8. Electronics and Electronic Equipment

AD-271 084 Div. 8, 25, 30
OTS Prices: HC $4.00/MF $1.00

RCA Defense Electronic Products, Camden, N. J.
FLUX LOGIC PERMALLOY SHEET MEMORY.
Quarterly progress rept. no. 1, 1 Jul-30 Sep 61,
by G. R. Briggs and R. D. Torrey. 30 Sep 61, 126p
Contract DA36 039sc88971, Task 3A99 15 001 03 02

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Thin films (Storage devices), Manufacturing methods), (*Computer storage devices, Metal films), (*Magnetic core storage, Thin films (Storage devices)), Printed circuits, Circuit interconnections, Microminiaturization (Electronics), Computers, Iron alloys, Nickel alloys, Amplifiers, Circuits, Wiring diagrams, Design, Magnetic cores, Computer logic.

This report gives results of research on memories using multiaperture elements of thin permalloy sheet with printed wire interconnections. Fabrication of the memory sheets is described, and results of operating tests of single elements and planes are given for both word organized and coincident current selection.

AD-406 882 Div. 8, 15
OTS Prices: HC $3.00/MF $0.50

Lincoln Lab. Mass. Inst. of Tech., Lexington.
OPTIMUM POWER DIVISION IN COHERENT COMMUNICATION SYSTEMS,
by H. L. VanTrees. 19 Feb 63, 52p LL-TR-301
ESD TDR63 68

Unclassified report

Descriptors: (*Radiofrequency power, Distribution), (*Optimization, Radiofrequency power), (*Communication theory, Demodulation), Data transmission systems, Digital systems, Phase modulations, Mathematical analysis, Probability, Sequences, Statistical processes, Radiofrequency filters, Errors, Communication systems.

This report considers the optimum way to divide the available energy between the channel measurement and information transfer functions. A binary, symmetric, phase-modulation system operating over a channel which imparts a random phase modulation to the signal and adds Gaussian noise is considered. An efficient demodulation scheme is optimized for all possible energy divisions at the transmitter. Then the energy division is varied to achieve the minimum probability of error. For the range of signal and channel parameters considered, it is shown that the probability of error is minimized by devoting all available energy to transmitting information and to operating on the sequence to measure the channel. It is concluded that from the theoretical standpoint, the modulation waveform should be used as part of the synchronization system. Also, the best strategy is to devote all the available power to modulation and obtain the synchronizing information by performing some operation on the incoming signal which removes its dependence on the data.

PB-166 255 Div. 8, 2
OTS Prices: HC $3.00/MF $0.75

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
ANTARCTIC RESEARCH AND DATA ANALYSIS. ATMOSPHERIC RADIO NOISE AT BYRD STATION, ANTARCTICA.
Scientific rept. 9,
by John R. Herman. 27 Dec 63, 66p RAD-TR-63-46
Grant NSF C255

Unclassified report

Descriptors: (*Radio interference, Diurnal variations), (*Atmospherics, Polar regions), Noise (Radio), High frequency, Magnetic storms, Thunderstorms, Aurorae, Absorption, Ionospheric propagation, Correlation techniques.

Atmospheric radio noise measured on the frequencies of 0.051, 0.113, 0.246, 0.545, 2.5, 5.0, 10, and 20 mc at Byrd Station, Antarctica, from March 1958 to December 1959, is investigated to establish diurnal, seasonal, and frequency variations. Since no thunderstorms occur at Byrd, the atmospheric noise is received only by ionospheric propagation modes from distant sources, such as the major active centers in Central Africa, the East Indies, and Central and South America. It is shown that the noise

This is a complete revision of all prior repts.: PB-161 093-1, PB-161 093-2, PB-161 093-3, PB-161 093-4, PB-161 093-5, PB-171 809, PB-171 809-1, PB-171 809-2, PB-171 809-3, PB-171 809-4, PB-171 809-5, PB-171 809-6, and PB-181 671.

Descriptors: (*Handbooks, Cryogenics), (*Cryogenics, Handbooks), (*Materials, Cryogenics), (*Metals, Cryogenics), Aluminum alloys, Stainless steel, Titanium alloys, Nickel, Titanium, Nickel alloys, Copper alloys, Chromium alloys, Molybdenum alloys, Cobalt alloys, Maraging steels, Copper, Beryllium alloys, Steel, Brass, Iron alloys, Plastics, Glass textiles, Mechanical properties, Thermal expansion, Thermal conductivity.

The completely revised 'Cryogenic Materials Data Handbook' presently contains mechanical and physical property data on 62 metallic and nonmetallic materials organized in eight sections. The Handbook also contains material, property, and accumulative indices and reference list. Progress reports to update and maintain the Handbook will be issued semiannually. (Author)

5. Communications

No Entries

6. Detection

AD-419 573 Div. 6, 25
OTS Prices: HC $3.00/MF $0.75

Naval Research Lab., Washington, D. C.
DETECTOR INVESTIGATION FOR 8-15 AND 100-4000 MICRON REGIONS.
Summary rept. for 1 Jul 61-30 Jun 63,
by R. F. Wallis and H. Shenker. 29 Aug 63, 60p
Projs. RR008 03 46 5664, ARPA Order 269 62
NRL 5996

Unclassified report

Rept. on Project Defender.

Descriptors: (*Infrared detectors, Design), (*Semiconductors, Infrared detectors), Infrared photoconductors, Photoconductivity, Infrared radiation, Photoelectric materials, Germanium, Impurities, Intermetallic compounds, Indium alloys, Antimony alloys, Hall effect, Magnetic fields, Theory.

As a result of theoretical and experimental work accomplished at NRL on photoconductive, long-wavelength detectors, a boron-doped germanium detector was developed which is sensitive to wavelengths as long as 125 microns and has a peak detectivity at 108 microns of 1.2 x 10 to 11th power cm - cps to the 1/2 power - reciprocal watts. Measurements made on the Putley infrared detector at magnetic fields up to 82 kgauss showed that this detector is usable at 4.2K at high magnetic fields. For 4-mm-wavelength radiation and for the conditions of test, the experimental measurements on the Putley detector are not consistent with it being an electron-bolometer-type detector, as had been hypothesized, but rather are consistent with it being a photoconductive-type detector. An analysis was made of the effect of coherent noise in the incident radiation on the detectivity of long-wavelength detectors, and a theoretical analysis of the separability of generation-recombination noise and mobility noise in semiconductor systems is given.

7. Electrical Equipment

AD-407 856 Div. 7, 14, 25
OTS Prices: HC $5.00/MF $1.00

Energy Conversion and Semiconductor Lab., Mass. Inst. of Tech., Cambridge.
RESEARCH ON MATERIALS, PROCESSES, AND DEVICES RELATED TO ENERGY CONVERSION.
Semiannual technical summary rept. (Scientific rept. no. 6,)
31 Dec 62, 158p DSR 8848-8849
Contract Nonr1841 78, Projs. NR099 360, ARPA Order 214 62

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy, see also AD-267 028.

Descriptors: (*Energy conversion, Scientific research), Superconductors, Solid solutions, Microstructure, Electrochemistry, Fuel cells, Electrodes, Hydrazine, Silver, Platinum, Thermoelectricity, Thermionic converters, Phase studies, Molybdenum alloys, Thorium compounds, Dioxides, Semiconductor devices, Solid state physics, Photoelectric effect, Zinc alloys, Antimony alloys.

Contents: superconducting materials and systems; electrochemical energy conversion research; high temperature metallurgy research on thermoelectric and thermionic materials; solid state energy converters; the development of thermionic emitter materials.

PB-166 219 Div. 7, 4
OTS Prices: HC $3.00/MF $0.50

General Electric Co., West Lynn, Mass.
RESEARCH ON LOW TEMPERATURE FUEL CELL SYSTEMS.
Progress rept. no. 12, 15 Jun-15 Aug 60.
15 Aug 60, 54p
Contract DA44 009ENG3771
AD 250 488

Unclassified report

See also PB-166 220.

Descriptors: (*Fuel cells, Low-temperature research), (*Power supplies, Electrochemistry), (*Electrodes, Fuel cells), Energy conversion, Hydrocarbons, Porous materials, Plastics, Catalysts, Nickel, Oxygen, Carbon.

FUEL ELECTRODE STUDIES: Work was continued on the testing of new cell structures made with porous catalyst screen electrodes and porous plastic electrodes. Wetting characteristics had an important effect on the performance of these electrodes. A number of Raney metal catalysts were prepared for future evaluation. The performances of Raney nickel and carbonyl nickel have been tested in experimental cells. When used with hydrogen, steady currents were obtained at high potentials, but at potentials below 0.8 volt the current rapidly fell with

Several aspects of pulsed microwave generation using ferrites are currently being investigated. This is a continuation of the ferrite program previously supported under Contract DA 36-039 SC 72785. The principal effort for the past quarter was expended in initial operation of the millimeter-wave apparatus, resulting to date in the first successful generation of K-band output. (Author)

PB-166 272 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Microwave Lab., Stanford Univ., Calif.
SOLID-STATE, TWO-LEVEL, HIGH-POWER MASER.
Rept. no. 3, 1 Jun-31 Aug 60.
Oct 60, 24p ML-752
Contract DA36 039sc85263, Proj. 3 99 00 000
AD 251 285

Unclassified report

Descriptors: (*Pulse generators, K-band), (*Microwave amplifiers, Millimeter waves), Ferromagnetism, Ferrites, Radiofrequency generators, Electromagnetic pulses, Magnetic fields, S-band, Spheres, Cylindrical bodies, Masers.

Further progress on the development of the pulsed ferrite generator is described. Results are given on some modifications which have resulted in reaching somewhat shorter output wavelengths, specifically 9 mm. An account is also given of work being done at K-band on the design of a high efficiency ferrite generator. Possibilities for increasing available power output at millimeter wavelengths using large ferrite samples are also discussed. (Author)

9. Fluid Mechanics

AD-416 794 Div. 9, 31
OTS Prices: HC $3.00/MF $0.75

Wigley (C.) London (England).
INTERFERENCE BETWEEN VISCOUS FLUID FLOW AND WAVE MOTION,
by C. Wigley. May 63, 71p
Contract N62558 3222, Task 062 211

Unclassified report

Descriptors: (*Ships, Hydrodynamics), (*Hydrodynamics, Ships), (*Water waves, Hydrodynamics), Viscosity, Fluid flow, Friction, Interference, Integrals, Ship models, Mathematical analysis, Boundary layer, Fluid dynamic properties.

This analysis confirms the suggestion that there is, for most forms, an increase in the frictional resistance at speeds where Froude number is greater than 0.35, and that this increase is associated with the trim of the form, both the increased resistance and the trim being caused by the change of flow round the model due to the wave motion. Since the frictional resistance at these speeds is therefore underestimated by the usual methods, the resistance derived for a ship from model experiment will always be overestimated a little, but this error will not generally be more than one or two per cent. Although the numerical work has not advanced enough to enable general conclusions to be finally drawn, yet it appears at the present stage that Laurentieff's application of Michell's integral to a form which is not a closed body underestimates very greatly the effect of viscosity on the wave resistance.

10. Fuels and Combustion

AD-442 442 Div. 10, 25, 27
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ABOUT A CERTAIN METHOD OF INVESTIGATING COMBUSTION CHAMBERS,
by R. Szymanik and R. Staniszewski. 12 Jun 64, 14p
FTD TT64 616; TT 64 71191

Unclassified report

Unedited rough draft trans. of Archiwum Budowy Maszyn (Poland) 1963, v. 10, no. 3, p. 239-247.

Descriptors: (*Combustion chambers, Mathematical analysis), Partial differential equations, Integral equations, Combustion, Thermal properties, Surface properties, Heat transfer.

A method is described for theoretically and experimentally investigating combustion chambers. Introducing a solution for heat equation and an expression for the disturbance of the combustion process to the Duhamel integral, the relationship was found between the parameters in the chamber and the thermal parameters on the outer surface (measured surface) of the wall. The problem was reduced to the solution of integral equation of the Volter type. (Author)

PB-166 213 Div. 10, 4
OTS Prices: HC $3.00/MF $0.75

SOVIET RESEARCH AND DEVELOPMENT ON THE CHEMISTRY OF PROPELLANTS.
Oct 64, 75p PAL-64-5

Unclassified report

Descriptors: (*Rocket propellants, Scientific research), Chemistry, Beryllium compounds, Aluminum compounds, Lithium compounds, Magnesium compounds, Halides, Hydrides, Boron compounds, Nitrogen compounds, Hydrogen, Liquified gases, Fluorine, Fluorine compounds, Perchloric acid, Perchlorates, Oxygen compounds, Oxides, Combustion, Thermodynamics, Corrosion, Erosion, Rocket motor nozzles, Reaction kinetics, Detonations, Explosions, Bibliographies.

Contents: Specific propellant ingredients; light metals and light metal hydrides, boron compounds, nitrogen compounds, liquid hydrogen, fluorine and fluorine compounds, perchloric acid and perchlorates, ozone, ozonides and superoxides, Studies relating to propellant applications; combustion, thermodynamic data, corrosion and erosion, nozzle reaction kinetics, reactions of solids, detonations and explosions, References; Appendix -- table of Soviet authors.

PB-166 287 Div. 10, 13, 18
OTS Prices: HC $10.80/MF $2.25

Little (Arthur D.), Inc., Cambridge, Mass.
STORAGE, TRANSFER, AND SERVICING EQUIPMENT FOR LIQUID HYDROGEN.
Final rept. for 1 May 58-31 Jul 59,
by B. M. Bailey, D. C. Benedict, R. W. Byrnes, C. R. Campbell, and A. A. Fowle. Jul 59, 780p
Contract AF33 616 5641, Proj. 6053, Task 60196
WADC TR59 386; AD 231 635

Unclassified report

level is affected by both changes in world thunderstorm activity and in propagation factors. In the high frequency band the noise sources in Central and South America are the major contributors to the noise power measured at Byrd Station. A 'noise index' is defined and used to select periods of anomalous absorption. Fourteen polar cap absorption (PCA) events are detected by the index, all of which have been previously reported on the basis of northern hemisphere observations. It is shown that the hf noise level at Byrd is severely depresses during PCA, especially on 5.0 and 10 mc. The minimum noise level observed during PCA is used to establish the man-made noise level at Byrd, which is about 23 db lower than that expected for a typical quiet receiving site as defined by the International Radio Consultative Committee (CCIR). Analysis of an auroral zone absorption event (22 to 31 October 1958) indicates that the absorbing region must be situated between Byrd Station and South America before the noise level is affected. Seventeen other auroral zone absorption events, eleven of which are associated with geomagnetic storms, have been detected by the noise index and are listed in the report. (Author)

PB-166 263 Div. 8
OTS Prices: HC $3.00/MF $0.75

Cruft Lab., Harvard Univ., Cambridge, Mass.
TRANSIENTS IN CYLINDRICAL ANTENNAS,
by H. J. Schmitt. 5 Jan 59, 92p Cruft-TR-296
Contract Nonr1866 26, Proj. NR371 015
DASA 1125; AD-216 884

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Antennas, Transients), (*Transients, Antennas), Cylindrical bodies, Antenna radiation patterns, Voltage, Partial differential equations, Boundary valve problems, Resistance (Electrical), Radio transmission.

Transients in cylindrical antennas are investigated for the particular case of a step-function excitation. The transient response of the radiation field of a driven antenna and the induced transient voltage on a loaded receiving antenna are considered. The theoretical analysis makes use of Fourier's theorem to express the response as an integral over the response to all individual frequency components. The response as a function of time, obtained by graphical integration, shows rapid oscillations with a periodicity determined by the first resonance frequency of the antennas. Transient times are discussed in their relation to the bandwidth of the antenna. By proper loading of the dipole, transient times of the order of the time needed for a wave to travel along the dipole axis can be obtained. The response of a receiving antenna and the response of a transmitting antenna for any kind of excitation are shown to be connected by a differentiation or integration process. An experimental investigation is described in which the reception of a transient field due to a shock-excited distant transmitting antenna is observed. The measured results are in very good agreement with the theoretical prediction. (Author)

PB-166 266 Div. 8
OTS Prices: HC $3.00/MF $0.75

Hermes Electronics Co., Cambridge, Mass.
INCLUSION OF ANTENNA PATTERNS IN ELECTRO-MAGNETIC SCATTERING PROBLEMS (FOR SPHERICALLY SYMMETRIC SCATTERING REGIONS).
Technical rept. no. 2,
by S. Stein. 1 Aug 59, 70p HEI-M-765
Contract Nonr2632 00
DASA 1156; AD 229 124

Unclassified report

Descriptors: (*Field theory, Scattering), (*Antenna radiation patterns, Scattering), (*Special functions (Mathematical), Antenna radiation patterns), (*Scattering, Antenna radiation patterns), Electromagnetic waves, Electromagnatic fields, Antennas, Mathematical models, Green's function, Equations, Propagation, Theory.

Electromagnetic boundary-value problems in three dimensions are usually solved in terms of point sources (the limiting form being incident plane waves). Such solutions are the Green's Functions from which, in principle, the field resulting from any distribution of current sources may be determined by integrations, although the actual integrations are usually too knotty to ever be carried out. On the other hand, there are theoretical problems in which it would be desirable to calculate the effects in terms of measurable antenna patterns, for example, when a beam is partially occluded by a large obstacle. The present paper indicates a first step in this direction, namely a systematic technique for establishing such a formulation in problems which can be solved naturally in spherical coordinates. The 'classical' spherical-mode wave functions are employed in this representation. The discussion includes a description of appropriate representations for fields and the antenna patterns, and of the wave-function addition theorems necessary for establishing the formulation.

PB-166 270 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Microwave Lab., Stanford Univ., Calif.
SOLID-STATE, TWO LEVEL, HIGH POWER MASER.
Rept. no. 4, 1 Sep-30 Nov 60.
Jan 61, 20p ML-786
Contract DA36 039sc85263, Proj. 3 99 00 000
AD 254 023

Unclassified report

Descriptors: (*Pulse generators, K band), (*Microwave amplifiers, Millimeter waves), Ferrites, Radiofrequency generators, Ferromagnetism, Magnetic fields, Electromagnetic pulses, Electrons, Spin, Low-pass filters, Shock waves, Equations, Waveguides, Masers.

A theoretical and experimental program on pulsed microwave generation without rf input signals is in progress. An experimental scheme which may accomplish this is proposed. Further investigations of high efficiency generation with the existing type of pulse generator are in progress. The experiments on components for the k-band high efficiency generator are continuing. A new approach to pulsed microwave generation using related pulsed field technology but new rf mechanisms involving microwave reflection from moving magnetic shock fronts is being examined. As proposed in the preceding report, efforts to reach shorter millimeter wavelength have been tabled, pending the development of better rf components. Pulsed field work is associated with the corona problem existing in the 100 kilogauss apparatus and with the development of pulsed fields for extended volumes. (Author)

PB-166 271 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Microwave Lab., Stanford Univ., Calif.
SOLID-STATE, TWO-LEVEL, HIGH-POWER MASER.
Quarterly progress rept. no. 2, 1 Mar-31 May 60,
Jun 60, 16p ML-726
Contract DA36 039sc85263, Proj. 3 99 00 000
AD 244 109

Unclassified report

Descriptors: (*Pulse generators, K band), (*Microwave amplifiers, Millimeter waves), Masers, Radiofrequency generators, Ferrites, Spheres, Garnet, Magnetic fields, Waveguides, S band.

Descriptors: (*Expanded plastics, Manufacturing methods), Density, Processing, Compressive properties, Impact shock, Viscosity, Pressure, Halogenated hydrocarbons, Hydrocarbons, Plastics, Polyester plastics, Aging (Materials).

The purpose of this investigation was to develop a method for producing a low density, foamed-in-place material. As will be seen in the succeeding exposition, this purpose has been successfully accomplished simply, with a minimum of modification of already available low-cost commercially-produced equipment. The fundamental idea upon which this program has been based involves the saturation with gas under pressure of catalyzed and accelerated liquid polyester resin and then permitting this mixture to expand into a mold where, after curing in a matter of minutes, a permanent stable light weight foam material results. The knowledge and experience gained from the preliminary small-scale low-pressure foam process were later applied to large-scale high-pressure foaming methods. (Author)

PB-166 245 Div. 14, 17, 26
OTS Prices: HC $1.00/MF $0.50

Ford Motor Co., Dearborn, Mich.
TITANIUM CARBIDE BASE CUTTING TOOLS.
Rept. no. 5, 1 Apr 56-31 Mar 57,
by Michael Humenik. 31 Mar 57, 16p
Contract AF33 600 32448
AD 138 774

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction will be made from best available copy.

Descriptors: (*Carbide tools, Cutting tools), (*Cutting tools, Carbide tools), (*Titanium compounds, Carbides), Cermets, Microstructive, Nickel, Molybdenum, Life expectancy, Hardness, Wear resistance, Surface properties.

The microstructure of cermet systems are analyzed on the basis of wettability of the nometallic shown. Improving the wettability of Ni-TiC systems by the addition of molybdenum resulted in a cermet having a uniform finely dispersed carbide phase in a metal matrix, having greater hardness. Compositions containing Ni-Mo-TiC were evaluated as cutting tools. The optimum tool life of Ni-Mo-TiC tools was found to be about 400 minutes as contrasted to about 12 minutes for a C-7 grade tungsten carbide evaluated under the same cutting conditions.)

PB-166 257 Div. 14, 6
OTS Prices: HC $3.00/MF $0.75

Lionel Corp., Irvington, N. J.
FABRICATION AND STUDY OF THE MAGNETO-MECHANICAL PARAMETERS OF A VARIETY OF FERRITES.
Final progress rept. for Jun 52-Dec 55,
by Paul O. Hoffmann. Dec 55, 62p
Contract Nonr729 00
AD 085 724

Unclassified report

Descriptors: (*Ferrites, Magnetostriction), (*Magnetostriction, Ferrites), Processing, Magnesium compounds, Oxides, Nickel compounds, Iron compounds, Solid solutions, Magnetic properties, Ceramic materials, Density, Elasticity, Sintering, Impurities, Transducers, Underwater sound equipment.

A study was made to develop a ferrite with dynamic magnetostriction characteristics for use as transducer material in underwater sound equipment.

15. Mathematics

AD-423 903 Div. 15
OTS Prices: HC $3.00/MF $0.75

Research Analysis Corp., McLean, Va.
PROGRAMMING UNDER NONLINEAR CONSTRAINTS BY UNCONSTRAINED MINIMIZATION: A PRIMAL-DUAL METHOD,
by Anthony V. Fiacco and Garth P. McCormick. Sep 63, 90p RAC-TP-96
Contract DA44 188AR01
N64 13244

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nonlinear programming, Calculus of variations), (*Linear programming, Transformations (Mathematics)), Mathematical programming, Sequences, Operations research, Optimization, Numerical methods and procedures, Functions, Vector analysis.

This paper describes the theoretical and computational aspects of a method for determining a vector x that yields the minimum of a given function f(x) subject to a collection of side conditions, g sub i (x)>O, i = 1, 2,..., m. This is a general statement of the so-called 'mathematical programming problem.' Although the methodology presented will handle the problem where f(x) and all the g sub i (x) are linear functions-i.e., linear programming-without difficulty, it is intended primarily to permit nonlinearities to enter into the objective function and the contraints-i.e.; nonlinear programming. The method used is based on an idea proposed by C. W. Carroll. The idea is that of transforming the given constrained problem into a sequence of unconstrained problems. The principal conclusion is that the method is highly competitive with the currently known techniques for solving nonlinear programming problems. This is particularly true for the class of problems having both a nonlinear objective function and nonlinear constraints. Theoretical validity has been demonstrated in only four or five other methods for this class of problems.

16. Medical Sciences

AD-432 462 Div. 16, 12
OTS Prices: HC $1.00/MF $0.50

Aerospace Crew Equipment Lab., Naval Air Engineering Center, Philadelphia, Pa.
PHYSIOLOGICAL EVALUATION OF FULL PRESSURE SUITS. DETERMINATION OF RESPIRATORY REQUIREMENTS FOR GAS MIXTURES IN MANNED SPACE CAPSULES,
by Edwin Hendler. 12 Mar 64, 12p
Task MR00513 10061
NAEC-ACEL 518

Unclassified report

Descriptors: (*Pressure suits, Hypoxia), (*Respiration, Astronauts), (*Decompression sickness, Astronauts), Closed ecological systems, Spacecraft, Manned, Oxygen, Nitrogen, Barometric pressure.

Requirements for artificial atmospheres in manned space vehicles are expressed in graphic form, taking into account varying proportions of oxygen and nitrogen in the respired

Descriptors: (*Liquefied gases, Hydrogen), (*Hydrogen, Liquefied gases), (*Storage, Liquefied gases), (*Handling, Liquefied gases), Low temperature alloys, Structural properties, Stainless steel, Aluminum, Mechanical properties, Phase studies, Thermal insulations, Materials, Thermal conductivity, Enthalpy, Entropy, Test methods, Test equipment, Pipes, Heat transfer, Costs, Storage tanks, Design, Pumps, High vaccum valves, Vaccum seals, Vaccum pumps, Vaccum gages, Flowmeters, Liquid level gages, Refrigeration systems, Therometers.

The purpose of this study is to provide engineering data concerning the most adequate, safe, and economical procedures and equipment for liquid hydrogen storage, transfer, and ground servicing systems. Our investigations have centered on the requirements for (1) storage vessels, (2) transfer lines, (3) pumping systems, (4) valves, (5) instruments, and (6) recondensing systems. Results, conclusions and recommendations are reported in separate chapters classified in accordance with the above-listed hardware items. (Author)

11. Ground Transportation Equipment

No Entries

12. Guided Missiles

AD-270 473 Div. 12, 4, 10
OTS Prices: HC $6.00/MF $1.25

Kidde (Walter) and Co., Inc., Belleville, N. J.
STUDY OF INTEGRATED CRYOGENIC FUELED POWER GENERATING AND ENVIRONMENTAL CONTROL SYSTEMS. VOLUME V. INTEGRATION AND CONTROL STUDIES.
Summary rept., phase 1, vol. 5,
by A. J. Jennings and G. M. Hall. Nov 61, 232p
Contract AF33 616 7508, Proj. 3145, Task 30328
ASD TR61 327 V5

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Manned spacecraft, Cryogenics), (*Cryogenics, Manned spacecraft), Propellants, Liquefied gases, Hydrogen, Oxygen, Cryogenic storage devices, Space environmental conditions, Control systems, Combustion, Attitude control systems, Spacecraft cabins, Cooling, Turbines, Fuel systems, Heat exchangers, Performance (Engineering).

The possible degrees of integration for a manned space vehicle using cryogenic hydrogen and oxygen as propellants were investigated. The combination of cryogenic storage of both fluids, use of hydrogen as the cooling medium in the environmental control system, and combustion of the two propellants to provide high energy gas to power the prime mover was found to be an attractive and basic integrated system. Other functions studied for possible additional integration included attitude control, cabin atmospheric control, and cooling by use of the oxygen heat sink. A stoichiometric combustion system using water for reaction cooling was analyzed. Factors involved in system selection were performance, integration compatibility, weight, volume, reliability and influence on vehicle design. Control studies were made of a promising system using supercritical storage of the cryogens, hydrogen cooling, and a four-stage turbine to drive the power generating system. Analog simulation showed stable performance within each subsystem and throughout the integrated network. An integrated cryogenic fueled environmental control and power generating system was found feasible from the control standpoint and considerably lighter than a non-integrated hydrazine power-water cooling system studied for comparison against the same requirements. (Author)

13. Installations and Construction

PB-166 315 Div. 13, 4, 25
OTS Prices: HC $3.00/MF $0.75

Dynatech Corp., Cambridge, Mass.
HEAT TRANSFER IN THE LIQUID-LIQUID SPRAY TOWER.
Research and development progress rept. SAL-2,
by S. P. Sukhatme and M. Hurwitz. 9 Sep 64, 68p
Dynatech-465
Contract 14 01 0001 382
OSW PR120

Unclassified report

Descriptors: (*Sea water, Desalination), (*Desalination, Heat transfer), Sprays, Hydrodynamics, Heat transfer coefficients, Drops, Jets, Electric fields.

This study analyzes the operation of liquid-liquid spray tower heat exchangers. It describes how the rational design of spray towers requires: 1. Hydrodynamic correlations which predict the expected drop size and hold-up, and, 2. Heat transfer correlations which either predict the area heat transfer coefficients on the inside and outside of the drops separately or the overall coefficient itself. The experimental portion of this program has been concerned with obtaining the above-mentioned heat transfer correlations for the case of water heated by AMSCO oil. The tests have been conducted with both water and oil as the dispersed phases under conditions of flooding and non-flooding. It has been demonstrated that stable flooded operation is possible when proper attention is paid to end design. Electric fields have been used at the distributor to obtain modest uniform reductions in drop size. However, since the same magnitude of reduction can be obtained easily by going to the jet-wise mode of drop formation, the use of EHD techniques in spray towers cannot be recommended. (Author)

14. Materials (Non-Metallic)

PB-166 168 Div. 14
OTS Prices: HC $3.00/MF $0.75

Marco Products Div., Celanese Corp. of America,
Linden, N. J.
CONDUCT RESEARCH AND DEVELOPMENT ON FOAMED-IN-PLACE LOW DENSITY CELLULAR PLASTIC MATERIALS.
Final rept., 1 Jun 51-1 Mar 53,
by Sanford Davis. 1 Mar 53, 64p
Contract NObs54184, Proj. NS034 045

Unclassified report

infusion of ACTH. It appears, therefore, that there may be extra-pituitary factors which lead to an enhanced adrenal cortical responsiveness to ACTH in hemorrhagic shock. (Author)

PB-160 188 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
ADRENAL CORTICAL FUNCTION IN HYPOTHERMIA.
Research rept., vol. 13, p. 651-662,
by Richard H. Egdahl, Don C. Nelson, and David M. Hume.
15 Sep 55, 16p
Proj. NM007 081 22 03

Unclassified report

Descriptors: (*Adrenal cortex hormones, Hypothermia), (Hypothermia, Adrenal cortex hormones), Surgery, Corticosteroid agents, Adrenal glands, Blood pressure, Stress (Physiology) Pituitary hormones, Dogs, Body temperature.

This report is based on 27 dog experiments in which the animals were cooled and adrenal-venous blood samples were taken during the induction of and rewarming from hypothermia. 17-hydroxycorticosteroids were determined by the method of Nelson and Samuels. It was found that there was a progressive and profound fall in the output of corticoids from the adrenal with fall in body temperature, and that corticoid outputs returned to normal upon rewarming. Infusions of ACTH during the cooling did not prevent corticoid depression, ruling out pituitary depression as the fundamental factor. Local cold to the adrenal gland with systemic normothermia resulted in corticoid falls, emphasizing the importance of local cold on the adrenal parenchyma. ACTH assays demonstrated a depression of circulating ACTH in the blood of hypothermic dogs, also. It is concluded that the adrenal cortex and pituitary participate in the general depression of metabolism which accompanies hypothermic states. (Author)

PB-160 191 Div. 16, 28
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
AMPUTATION, BODY IMAGE, AND PERCEPTUAL DISTORTION: A PRELIMINARY STUDY.
Research rept., vol. 12, p. 587-600,
by Rodman Gilder, Jr., S. V. Thompson, C. W. Slack, and K. B. Radcliffe, Jr. 17 Dec 54, 14p
Proj. NM004 008 04 03

Unclassified report

Descriptors: (*Emotions, Visual perception), (*Visual perception, Distortion), (*Amputees, Visual perception), Psychiatry, Psychometrics, Projective techniques, Vision, Abnormal psychology, Reaction (Psychology), Anxiety, Memory, Personality, Wounds and injuries, Stress (Psychology).

Most subjects perceive distortion when viewing a human figure through aniseikonic lenses. In this preliminary study subjects have viewed through these lenses various human figures including normal figures, amputees, figures with suggested injury, manikins, and figures in authority. In many cases subjects have reported perception of markedly diminished distortion on viewing such figures. Evidence from perceptual tests and corollary psychiatric interviews indicates that emotional factors, rather than optical factors per se, are responsible for such effects on perception. Some of the mechanisms by which emotional factors operate to influence perception are offered as hypotheses. Suggestions for further study are made. (Author)

PB-160 193 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
ANAEROBIC STUDIES OF STEROIDOGENESIS USING THE PERFUSED CALF ADRENAL.
Research rept., vol. 14, p. 371-380,
by George Rosenfeld and Willard D. Bascom. 6 May 56, 12p
Proj. NM006 012 04 98

Unclassified report

Descriptors: (*Corticosteroid agents, Biosynthesis), (*Adrenal cortex hormones, Oxygen), Adrenal glands, Enzymes, Steroids, Nitrogen, Metabolism, Carbon dioxide, Biological assay.

The main objective of the present investigation was to ascertain whether, aside from an active oxidative metabolism, aerobic conditions were required for the biogenesis of corticoids. The experimental technique involved the in vitro perfusion for 1 hour of 4 isolated calf adrenals with a well-oxygenated artificial medium. The 4 contralateral glands were concurrently perfused in another apparatus with a liter of the same fluid, treated with a stream of nitrogen and containing 2.5 gm. of 2, 3, 5-triphenyl tetrazolium chloride in lieu of oxygen as a hydrogen acceptor. Either ACTH (25 I.U.) or a steroid substrate, e. g., compound S, DOC, 21-desoxycortisone, progesterone or dehydroisoandrosterone, was added to the media. The effluent steroids were extracted and, after paper partition chromatography, were eluted and assayed by the Porter-Silber (compounds F and E), phosphomolybdic acid (compound B), and Zimmermann (C19-ketosteroids) reactions. The results of the ACTH-stimulation studies demonstrated that despite an active oxidative metabolism, the glands perfused anaerobically (N2 plus TTC) secreted little or no compounds F, E, and B in marked contrast to the contralaterals perfused aerobically (95 percent 02/5 percent C02). That this disparity in output was due to a failure in biosynthesis rather than release was shown by the presence of only minor amounts of residual corticoids in the perfused experimental organs.

PB-160 195 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
AN ANALYSIS OF THE EFFECTS OF TOTAL BODY X-IRRADIATION ON THE BODY WEIGHT OF WHITE SWISS MICE. II. BODY WEIGHT CHANGES OF MALE MICE AS A BIOLOGICAL DOSIMETER.
Research rept., vol. 13, p. 965-984,
by William H. Chapman and Edward A. Jerome.
9 Dec 55, 26p
Proj. NM006 012 04 68
AD 99 086

Unclassified report

Descriptors: (*Radiological dosage, Body weight), (*Body weight, Radiological dosage), Whole body irradiation, Lethal dosage, Sublethal dosage, Dosimeters, Mice.

In order to explore the possibilities of basing a dosimetric technique on the weight response of male albino mice to radiation, the relation between weight changes and amount of radiation was analyzed for each of the first 13 days after irradiation. A linear relation was found between the percent-weight-change and the amount of radiation over the lethal range on each of the postirradiation days, different constants being characteristic of different days. It was therefore possible to develop a formula for estimating dose from information concerning the day on which a given average percent weight change occurred. The relative error in estimating dosage in this manner was in the order of 3 percent, though different for the various doses on the several days. Additional data and analyses are given for doses within the sublethal and supralethal ranges, though it appears that data within these ranges cannot be subsumed under the formulae effective within the lethal range. (Author)

gaseous mixture, as well as initial pressure (before decompression) and final pressure (after decompression). Criteria used in the determination of artificial atmosphere requirements include avoidance of both hypoxia and decompression sickness due to pressure changes. (Author)

PB-160 134 Div. 16, 4
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
ON INTERMOLECULAR AND INTRAMOLECULAR INTERACTIONS BETWEEN INDEPENDENT PAIRS OF BINDING SITES IN PROTEINS AND OTHER MOLECULES.
Research rept., vol. 14, p. 445-470,
by Terrell L. Hill. 4 Jun 56, 32p
Proj. NM000 018 06 51

Unclassified report

Descriptors: (*Proteins, Molecular association), Chemical bonds, Dissociation, Ions, Mathematical models, Thermochemistry, Volumetric analysis.

The Kirkwood-Shumaker suggestion, that matching constellations of dissociable groups on two different protein molecules might lead to a significant intermolecular attractive force, is examined in terms of two models. The general conclusion reached is that in many cases the Kirkwood-Shumaker proposal is a very reasonable one. Two related topics also discussed are: (1) the intermolecular or intramolecular potential of average force between two groups whose charges are not permanent but fluctuate because of binding equilibria with ions in solution; and (2) the effect of pairs of interacting groups on titration curves of proteins and other molecules. (Author)

PB-160 185 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE ACTION OF ANTIMALARIAL DRUGS IN MOSQUITOES INFECTED WITH PLASMODIUM GALLINACEUM.
Rept. no. 8,
by Levon A. Terzian, Nathan Stahler, and A. B. Weathersby. 1 Jul 48, 22p
Proj. NM007 007

Unclassified report

Descriptors: (*Antimalarials, Effectiveness), (*Anopheles, Antimalarials), (*Aedes, Antimalarials), (*Plasmodium, Antimalarials), Drugs, Disease vectors, Parasitic diseases, Hemosporidia, Life cycle, sulfadiazine, Vitamin B complex, Vertebrates, Invertebrates.

Using a method previously devised to incorporate antimalarial drugs in the diet of infected mosquitoes, it has been shown that sulfadiazine, metachloridine and paludrine, which have a prophylactic effect on sporozoite induced infections of P. gallinaceum in the vertebrate host, have similar prophylactic effect in the invertebrate host in that they permanently arrest the development of oocysts and prevent the formation of sporozoites. On the other hand, quinine, quinacrine, plasmochin and other non-prophylactic drugs, which have no prophylactic activity in the vertebrate host, are similarly ineffective in the mosquito since they have no effect on the development of the parasite and the formation or production of sporozoites. This similarity in drug action between vertebrate and invertebrate hosts obtains with other species of Plasmodia and their vectors. In view of this evident similarity between the sporogonous and schizogonous cycles, this method of drug evaluation in the mosquito may offer a useful approach in the search for prophylactic compounds for the human malarias. (Author)

PB-160 186 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE ACTION OF ANTIMALARIAL DRUGS IN MOSQUITOES INFECTED WITH PLASMODIUM FALCIPARUM.
Rept. no. 7,
by Levon A. Terzian and A. B. Weathersby. 9 Jun 48, 8p
Proj. NM007 007

Unclassified report

Descriptors: (*Anopheles, Antimalarials), (*Antimalarials, Plasmodium), Life cycle, Parasitic diseases, Hemosporidia, Drugs, Cinchona alkaloids, Sulfadiazine, Infections.

With a drug-diet method devised for the adminstration of various concentrations of antimalarial compounds, it has been possible to drug mosquitoes infected with Plasmodium falciparum and to test the effects of these compounds on the sporogonous cycle of the parasite. It has been found that quinine, quinacrine, sontochin and sodium sulfadiazine administered in various concentrations to infected mosquitoes have no effect on the development of oocysts or the production of sporozoites. Oocysts and sporozoites from such mosquitoes were indistinguishable from the oocysts and sporozoites found in mosquitoes maintained on sugar solutions alone. On the other hand, in mosquitoes maintained on paludrine, sporozoites could not be demonstrated, and the mosquitoes remained consistently negative. From the known effects of paludrine and the other drugs cited, on sporozoite induced infections of P. falciparum, it would appear, therefore, that there is a definite relation between drug effect in the sporozoite-infected vertebrate host and the drug effect in the infected invertebrate host. (Author)

PB-160 187 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
ADRENAL CORTICAL FUNCTION IN EXPERIMENTAL SHOCK, MEASURED BY ADRENAL VENOUS BLOOD CORTICOSTEROID SECRETION.
Research rept., vol. 13, p. 167-176,
by D. M. Hume and D. H. Nelson. 29 Mar 55, 14p
Proj. NM007 081 22 01

Unclassified report

Descriptors: (*Shock (Pathology), Adrenal cortex hormones), (*Adrenal cortex hormones, Shock (Pathology)), Corticosteroid agents, Adrenal glands, Blood circulation, Surgery, Hemorrhage, Blood transfusions, Pituitary hormones, Secretion.

A study has been made in the dog of the rate of blood flow through the adrenal, the minute output of corticoids, and the concentration of corticoids per milliliter of adrenal blood under the following conditions: 1) during operative trauma; 2) in oligemic shock, created by bleeding the traumatized, anesthetized animal; and 3) in the convalescent period following surgical trauma. It has been shown that the 17-hydroxycorticosteroid output in the adrenal venous blood is much greater during and immediately after operative trauma than in the convalescent period. The minute output of corticoids tends, in the immediate postinjury period, to remain at a fairly constant high level in spite of variations in adrenal blood flow. In hemorrhagic shock there is a marked decrease in adrenal blood flow, but the adrenals continue to secrete high levels of corticoids by virtue of a tremendous increase in concentration of corticoid per unit of adrenal venous blood. The secretion of cortical hormones diminishes only in the extremes of oligemic shock, when the adrenal blood flow approaches zero. With the transfusion of the lost blood, the adrenal is immediately able to resume secretion at a high level. In some experiments there was moderate to marked increase in the output of corticosteroids noted in shock over that seen with operative trauma alone. An increased secretion of ACTH appeared to play a role in this increase. However, the same phenomenon was observed in six of nine hypophysectomized dogs who were bled while receiving a constant

Descriptors: (*Adrenal cortex hormones, Fevers), (*Fevers, Adrenal cortex hormones), Corticosteroid agents, Adrenal glands, Stress (Physiology), Pituitary glands, Body temperature, Dogs, Blood chemistry.

The effect of acute hyperthermia on adrenocortical function was studied by measuring 17-hydroxycorticosteroids in adrenal venous blood of anesthetized dogs. Dogs immersed to the shoulders in 50C. water respond initially with a rapid increase in rectal temperature (42C. in 15 to 20 minutes), a marked (two-to seven-fold) increase in adrenal corticoid output, and a slight (10 to 20 percent) increase in adrenal venous blood flow. When a rectal temperature of 44 to 45C. was attained, circulatory failure occurred and a concomitant decrease in adrenal corticoid output and venous blood flow ensued. Dogs subjected to a gradual increase in body temperature had increased adrenal 17-hydroxycorticosteroid secretion in the rectal temperature range of 39 to 40C., but this stimulatory response subsided as body temperature was further increased. Hypophysectomy abolished the adrenocortical response to hyperthermia, thus showing that the increased secretory activity of the adrenal cortex in hyperthermia is mediated via the pituitary gland.

PB-160 218 Div. 16, 23
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF ALCOHOL UPON LINK TRAINER PERFORMANCE,
by Simon W. Eyer and James B. Ivers. 9 Jun 50, 16p
Proj. NM001 056 06 01

Unclassified report

Descriptors: (*Beverages, Performance(Human)), (*Performance (Human), Flight simulators), (*Pilots, Drugs), Training devices, Models (Simulations), Behavior, Reaction (Psychology), Motor reaction, Test methods, Psychomotor tests.

Link Trainer performance, after ingestion of whiskey, was tested in two groups of subjects. Of the four subjects in the first group, one showed a significant impairment of performance with a dosage of 60 ml. of 86 proof straight Bourbon whiskey. In the second group, three of six subjects showed impairment of performance with 120 ml. of 86 proof straight Bourbon whiskey. Means of improving methods of testing and scoring are discussed. It is concluded that the Link Trainer can be used to measure the effect of drugs upon the performance of a skilled task under certain conditions. However, as used in these studies the Link Trainer is too insensitive, and the training of subjects for its operation too time consuming, for its employment as a satisfactory laboratory instrument. (Author)

PB-160 221 Div. 16, 14
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF ARTIFICIAL SURFACES ON BLOOD COAGULABILITY WITH ESPECIAL REFERENCE TO POLYETHYLENE.
Rept. no. 2,
by T. J. Donovan and B. Zimmermann. 9 Aug 48, 16p
Proj. NM007 025

Unclassified report

Descriptors: (*Blood coagulation, Polyethylene plastics), (*Polyethylene plastics, Blood coagulation), Surfaces, Medical equipment, Surgery, Blood vessels, Tissues (Biology), Water, Fibrin, Blood platelets, Acrylic resins, Glass, Colloids.

The reaction to small pieces of polyethylene and lucite in the subcutaneous tissues of 30 rats was studied at intervals up to three months after insertion. Polyethylene was shown to compare favorably in respect to minimum tissue reaction, with the well-tolerated lucite. A series of clotting times was performed in polyethylene, paraffin, collodion and glass tubes. The clotting time in polyethylene tubes was about twice as long as in glass, and nearly as long as in paraffin and collodion-lined tubes. These data are similar to Hirschboeck's findings for lucite tubes. Clot retraction was found to be moderate and essentially similar in polyethylene, paraffin and glass tubes. It was slight or absent in collodion tubes. Capillary tubes of polyethylene were shown to repell water initially and then gradually to attract water over a period of days to a maximum height about one-half of that in glass tubes. Thus polyethylene follows Lampert's rule, which states that the effect of a surface in delaying the coagulation of blood is proportional to the capacity of that surface for repelling water. (Author)

PB-160 222 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF BREATHING OXYGEN AT 2.5 ATMOSPHERES ON THE RATE OF ELIMINATION OF CARBON MONOXIDE IN MAN,
by Grover C. Pitts and Nello Pace. 21 Nov 49, 10p
Proj. NM001 056 01 14

Unclassified report

Descriptors: (*Carbon compounds, Monoxides), (*Pressure breathing, Oxygen), Respiration, Barometric pressure, Air, Blood analysis, Tissues(Biology), Poisoning, Anoxia, Medical equipment, Least squares method.

The comparative rate of loss of carbon monoxide from the blood of five men breathing air and oxygen, respectively, at 2.5 atmospheres absolute pressure has been measured. The initial blood CO concentration was approximately 4 volumes per cent, and the period of exposure to each test gas was one hour. The advantage of oxygen over air in eliminating CO from the body is indicated by the respective half-lives (t 1/2) which are 68.3 and 19.8 minutes. It is pointed out that the blood of men breathing oxygen at 2.5 atmospheres carries sufficient oxygen in physical solution to meet the needs of the tissues. From a therapeutic standpoint this immediate alleviation of hypoxemia plus the secondary great increase in the rate of CO elimination should prevent many of the incapacitating sequelae which usually follow severe CO poisoning. It is indicated how a simple, inexpensive pressure chamber for administering this therapy could be provided in any hospital. Adaptation of the Thunberg Respirator is suggested. (Author)

PB-160 223 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
EFFECT OF CARBON DIOXIDE ON THE RATE OF DENITROGENATION IN HUMAN SUBJECTS,
by Rodolfo Margaria and Julius Sendroy, Jr. 8 Aug 50
24p
Proj. NM004 005 04 05

Unclassified report

Descriptors: (*Decompression sickness, Carbon dioxide), (*Carbon dioxide, Decompression sickness), Nitrogen, Oxygen, Mathematical analysis, Experimental data, Respiration, Blood circulation, Tissues (Biology), Pressure, Anoxia, Barometric pressure, Tolerances (Physiology), Equations.

Following exposure to pressure at slightly more than 2 atmospheres (absolute) for four hours, the rate of N2 elimination from the body has been measured in man, over periods of from 10 to 15 minutes to 50 to 120 minutes of

PB-160 199 Div. 16, 4
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
APPROXIMATE CALCULATION OF THE ELECTROSTATIC FREE ENERGY OF NUCLEIC ACIDS AND OTHER CYLINDRICAL MACROMOLECULES.
Research rept., vol. 13, p. 897-906,
by Terrell L. Hill. 9 Dec 55, 12p
Proj. NM000 018 06 42

Unclassified report

Descriptors: (*Polymers, Electrostatics), (*Nucleic acids, Electrostatics), Thermochemistry, Electrolytes, Proteins, Desoxyribonucleic acids, Volumetric analysis, Synthesis (Chemistry), Adenosine phosphates, Hydrolysis, Models (Simulations), Cylindrical bodies, Numerical analysis.

Equations are derived for the electrostatic free energy of certain spherical and especially cylindrical models of charged macromolecules immersed in an electrolyte solution. The equations should be useful, for example, in the interpretation of ion binding and titration curves of proteins, nucleic acids, etc. Another application, which is discussed is the calculation of the electrostatic contribution to the free energy of hydrolysis of ATP and synthesis of DNA. The possible relation of the work to the mechanisms of nucleic acid and protein syntheses is pointed out. (Author)

PB-160 202 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE AUGMENTATION OF THE PYROGENIC AND LEUKOCYTIC EFFECTS OF TYPHOID VACCINE BY HOMOLOGOUS PLASMA IN THE RABBIT.
Rept. no. 17,
by Richard S. Farr, Virgil S. Lequire, Paul K. Schork, and Charles H. Gayhart. 27 Sep 48, 22p
Proj. NM007 039

Unclassified report

Descriptors: (*Salmonella, Pyrogens), (*Leukocytes, Salmonella), (*Vaccines, Solvents), Blood plasma, Body temperature, Fevers, Blood diseases, Dosage, Rabbits.

The effects of intravenously administered typhoid vaccine upon the temperature and leukocyte population of the rabbit were studied. It was found that small amounts of vaccine caused little or no fever, a heterophile leukocytosis, and a mononuclear leukopenia. Larger doses caused a high fever, an initial heterophile leukopenia, followed by a secondary leukocytosis, and a sustained mononuclear leukopenia. The temperature and leukocyte response of the rabbit to killed Eberthella typhosa organisms is also influenced by the menstruum in which the organisms are suspended. Ten times the number of organisms are required in the saline suspension to produce a comparable response with the organisms suspended in homologous plasma. The difference between the plasma and the saline reaction appeared to be quantitative except for the earlier onset of fever when the organisms were given in plasma. It is believed that a total leukocyte count without a complementary differential count is not a reliable method of determining pyrogenicity of E. typhosa by the rabbit test. (Author)

PB-160 209 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
BLOOD FLOW CHANGES IN THE LEG OF THE DOG FOLLOWING COLD INJURY.
Research rept., vol. 14, p. 877-890,
by Esther Hardenbergh and Paul G. Bamberg. 8 Nov 56, 20p
Proj. NM007 081 14 03

Unclassified report

Descriptors: (*Exposure, Blood circulation), (*Blood circulation, Exposure), Freezing, Vasoactive agents, Injection (Medicine), Epinephrine, Acetylcholine, Alcohols, Carbon dioxide, Solidified gases, Tissues (Biology), Blood vessels, Dogs, Laboratory equipment.

In an attempt to determine the nature of the circulatory changes which occur in tissues injured by exposure to cold, the rate of venous outflow was studied in the dog's hind leg exposed to freezing temperatures. Before exposure to cold, control flow rates were determined, and changes in flow were measured following the injection of vascoactive drugs. Measurements were continued during a 30-minute immersion of the leg in an alcohol and solid carbon dioxide bath (approx. -30 C.), and then for several hours after the leg had been removed and thawed. Control blood flow rates were found to vary considerably from animal to animal (20 to 90 cc/minute) but varied little in each individual. During exposure to cold, in most of the experiments, the legs froze: flow decreased almost to zero, and the temperature in the leg fell well below 0C. In some experiments, however, the legs did not freeze: flow remained high throughout exposure, and tissue temperature remained above 0C. In response to the injection of vascoactive drugs, the control venous outflow showed: (a) A decrease after intravenous epinephrine. (b) A decrease after intra-arterial epinephrine into the experimental leg. (c) A transient increase after intra-arterial acetylcholine into the experimental leg. After exposure to cold, the legs which did not freeze still showed these reactions. However, in the legs which were frozen, the reactions to intra-arterially injected drugs were very much diminished, and the flow was increased instead of decreased when epinephrine was intravenously administered. (Author)

PB-160 210 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
BODY FLUIDS IN HYPERTENSION AND MILD HEART FAILURE.
Research rept., vol. 13, p. 565-580,
by M. Walser, B. J. Duffy, and H. W. Griffith.
13 Sep 55, 16p
Proj. NM007 081 16 04

Unclassified report

Descriptors: (*Cardiovascular diseases, Body fluids), (*Hypertension, Body fluids), (*Body fluids, Measurement), Edema, Blood volume, Heart, Body weight, Labeled substances, Radioactive isotopes, Sulfates.

Extracellular fluid, estimated with the aid of radiosulfate and blood volume, estimated with the aid of radiochromium-labelled erythrocytes may be determined simultaneously using a single blood sample. In normal subjects weight, surface area and blood volume were compared as referents for extracellular fluid volume (ECF). The variability was identical with all these referents. Consequently, ECF values were expressed as percentage of weight. In patients with heart failure but no edema ECF averaged 22.5 percent as compared with 16.1 percent in 30 normal subjects. In patients with uncomplicated essential hypertension ECF was normal (16.2 percent). The blood volume did not differ significantly in the three groups. (Author)

PB-160 215 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF ACUTE HYPERTHERMIA ON ADRENAL 17-HYDROXYCORTICOSTEROID SECRETION IN DOGS.
Research rept., vol. 14, p. 287-296,
by John B. Richards and Richard H. Egdahl.
9 Apr 56, 16p
Proj. NM007 081 22 11

Unclassified report

Descriptors: (*Peritoneum, Purification), (*Alcohols, Toxicity), Blood diseases, Blood chemistry, Tissues (Biology), Excretion, Toxic tolerances, Lethal dosage, Rats.

The technic of using modified Tyrode's solution for treatment of uremia due to acute renal failure has been modified to apply to the treatment of white rats receiving 36 cc. of 50 per cent methyl alcohol per kilogram of body weight. In untreated rats this dosage was found to be about LD90. Twenty-four out of 30 rats treated by peritoneal lavage survived. Analysis for methyl alcohol showed an average recovery from peritoneal washings of 43 per cent for the ten-hour period following oral administration. The level of methyl alcohol in the brain tissue of treated rats was 2.5 mg/gm. and 8.4 mg/gm. in untreated rats. Blood levels in the untreated rats averaged 8.2 mg. per cc. over a 36-hour period. Peritoneal washings showed a rapidly decreasing amount of methyl alcohol during the first six hours and a gradual decrease in the following hours. Rats perfused without receiving methyl alcohol showed an insignificant amount of any oxidizable material which might give a false reading for methyl alcohol. It is concluded that rats can be protected against lethal doses of methyl alcohol by peritoneal lavage. (Author)

PB-160 230 Div. 16, 28
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF IPRAL SODIUM UPON LINK TRAINER PERFORMANCE.
Research rept., vol. 12, p. 645-668,
by Ray C. Hackman and Norman Lee Barr. 22 Dec 54, 26p
Proj. NM001 056 06 03

Unclassified report

Descriptors: (*Barbiturates, Performance (Human)), Psychomotor tests, Drugs, Dosage, Blood pressure, Pulse rate, Psychophysiology, Tolerances (Physiology), Pilots, Training devices, Analysis of variance.

The effects of 1.5 gr. and 3.0 gr. oral doses of ipral sodium on the psychomotor performance and circulatory physiology of four trained subjects were tested. Measures of performance were obtained while subjects flew a standard Baker pattern and solved a succession of radio range problems in the Link trainer. Measures of pulse rate, blood pressure, and critical flicker frequency were obtained before ingestion of ipral sodium or placebo, 25 minutes later, and after subject had performed in the trainer. It is concluded that: (1) The Link trainer as scored is sufficiently sensitive to reflect differences in performance, provided efficient statistical designs are used. (2) Both increments and decrements in performance will occur in some subjects following ingestion of ipral sodium, and these will be consistent for a particular subject. (3) Both increases and decreases in variability of performance will be observed in some subjects following ingestion of ipral sodium, and these will be consistent for a particular subject. (4) Few, if any, objective physiological effects ascribable to ipral sodium will occur when single doses of 3.0 gr. or less are employed. (Author)

PB-160 231 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF MECHANICAL VIBRATION ON THE PATELLAR REFLEX OF THE CAT.
Rept. no. 2,
by David E. Goldman. 17 Mar 48, 8p
Proj. NM004 001

Unclassified report

Descriptors: (*Vibration, Reflexes), Inhibition, Autonomic nervous system, Sound, Humans, Cats.

Observations on the effect of mechanical vibration on the patellar reflex of the cat confirm those of previous investigators in that vibration produces an inhibition. However, this inhibition was found to be independent of the autonomic nervous system. Evidence is presented for the concept that mechanical vibration acts by preempting the stretch reflex pathway. As a function of frequency of vibration, the inhibition appears between 10 and 30 cps. and fades out between 300 and 600 cps. with the apparatus used. The relation of this phenomenon to effects of vibration or intense sound on man is discussed. (Author)

PB-160 239 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
EFFECTS OF COMBINED ACTION OF HISTAMINE AND POTASSIUM ON MICE AND GUINEA PIGS.
Research rept., vol. 12, p. 539-548,
by R. L. Zwemer, R. Truscoe, and J. J. Martorano.
23 Nov 54, 10p
Proj. NM007 081 17 01

Unclassified report

Descriptors: (*Histamine, Toxic tolerances), (*Toxic tolerances, Histamine), (*Potassium, Toxic tolerances), Shock (Pathology), Glutathione, Chlorides, Antihistaminics, Blood plasma, Dosage, Guinea pigs, Mice, Rabbits, Injection (Medicine), Tissue fluids.

The experiments reported show that fatal shock can be produced at lower dosage levels of histamine and potassium when these two substances are given at the same time. Both guinea pigs (which are very susceptible to histamine) and mice (which are markedly resistant) show this decrease in resistance to potassium when it is given in conjunction with histamine. In guinea pigs 0.7 g/kg. killed 23 out of 42 animals or 55 percent; 3 mg/kg. of histamine gave a mortality rate of 17.5 percent or 7 animals out of 40. When these substances were combined it was toxic 78 percent or 31 of 40 animals. In a similar experiment on mice an injection of 0.65 g/kg. of KCl killed 46 of 136 animals or 34 percent; histamine when given at the dosage level of 60 mg/kg. gave a mortality rate of 1.3 percent or 1 animal out of 77. Here again when these substances were combined the mortality rate was increased, 76 out of 114 or 67 percent died. Variations in the amounts of histamine, and of potassium were tried in 409 mice and 162 guinea pigs. The relationship of mortality to the time each substance was injected was also studied in 57 mice. Glutathione, which has been shown to protect against potassium, was tried against a histamine-potassium combination. Control animals which had received 60 mg/kg. of histamine and 0.65 g/kg. KCl had a mortality rate of 74 percent or 40 out of 53 mice; whereas those that had previously been injected with glutathione and then given the same KCl-histamine combination as in the controls gave a mortality rate of 31 percent or 18 out of 58 animals. (Author)

PB-160 240 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
EFFECTS OF INJECTION OF RADIOGALLIUM (Ga72).
Research rept.,
by H. C. Dudley, L. J. Louviere, and J. C. Shaw.
15 Sep 51, 14p
Proj. NM007 081 06 01

Unclassified report

Descriptors: (*Radiation effects, Gallium), (*Gallium, Radiation effects), (*Injection (Medicine), Gallium), Radiobiology, Leukocytes, Toxicity, Toxic Tolerances, Radiological dosage, Laboratory animals, Citrates, Guinea pigs, Radioactive isotopes, Blood diseases, Whole body irradiation, Hematology, Dogs, Rabbits, Mice.

Radiogallium (Ga72) citrate was administered to five

inhalation of an N2-free gas mixture. Mathematical analysis and correction of the experimental data have been made. On breathing a 3% CO2-oxygen mixture, the rate of N2 elimination is not appreciably altered. A 5% CO2-oxygen mixture causes an increase of 70% in the velocity constant of the fast component, while it may slightly decrease the speed of the slow process. Although ventilation changes become much greater as the CO2 tension is increased, the effect observed on the administration of the 5% CO2 mixture is attributed in the main, to an increased blood flow through some areas (watery tissues, brain, muscles, etc., responsible for the faster component) and to a possible decrease in blood flow in others (particularly fat tissues, responsible for the slower component). (Author)

PB-160 225 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF CHLORPROMAZINE ON PITUITARY ACTH SECRETION IN THE DOG.
Research rept., vol. 13, p. 545-552,
by Richard H. Egdahl, John B. Richards, and David M. Hume. 16 Aug 55, 12p
Proj. NM007 081 22 04

Unclassified report

Descriptors: (*Chlorpromazine, Pituitary hormones), (*Pituitary hormones, Chlorpromazine), Drugs, Corticosteroid agents, Adrenal cortex hormones, Secretion, Pituitary gland, Adrenal glands, Injection (Medicine), Dosage, Dogs, Chemotherapy.

The effect of chlorpromazine on adrenal-cortical function was determined by measuring 17-hydroxycorticosteroids in adrenal venous blood of dogs following intravenous injection of the drug. It was found that approximately half of the animals had significant adrenal responses to the injection of 1.3 to 3.3 mg/kg. of chlorpromazine, and that all animals responded to dosages of 3.5 mg/kg. and above. The adrenal response was abolished by hypophysectomy, ruling out a direct action of the drug on the adrenal gland. The response was unaffected by maintaining high peripheral blood levels of 17-hydroxycorticosterone. These observations suggest that chlorpromazine stimulates the release of ACTH from the adenohypophysis. (Author)

PB-160 226 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF CO2 EXPOSURE AND RESPIRATORY ACIDOSIS ON ADRENAL 17-HYDROXYCORTICOSTEROID SECRETION IN ANESTHETIZED DOGS.
Research rept., vol. 14, p. 589-600,
by John B. Richards and S. N. Stein. 27 Aug 56, 20p
Proj. NM007 081 22 12

Unclassified report

Descriptors: (*Carbon Dioxide, Adrenal cortex hormones), (*Adrenal cortex hormones, Carbon Dioxide), Corticosteroid agents, Secretion, Pituitary gland, Adrenal glands, Respiratory system, Acidosis, Anesthesia, Dogs.

The effect of CO2 exposure on adrenocortical function was studied by measuring 17-hydroxycorticosteroids in adrenal venous blood of anesthetized dogs. In dogs exposed to 2.5, 5 and 10 percent CO2 successively for 1 hour each, and 10, 20 and 30 percent CO2 successively for 1 hour each, adrenocortical stimulation occurred in 10 percent of the total number of dogs exposed to 2.5 CO2, 40 percent of the animals exposed to 5 percent CO2, 75 percent of dogs exposed to 10 percent CO2, and in all dogs subjected to 20 and 30 percent CO2. Exposure to increasing concentrations of CO2 was accompanied by a progressively severe respiratory acidosis. Dogs exposed to 20 percent CO2 for 4 hours displayed a maximal adrenocortical stimulation within the first 15 to 30 minutes, and this marked response persisted for the remainder of the exposure period. The adrenocortical stimulatory response to 20 percent CO2 exposure is abolished by hypophysectomy. It is concluded that the pituitary adrenal stimulation occurring in anesthetized dogs exposed to CO2 is induced by one or more of the physiologic alterations attendant respiratory acidosis. (Author)

PB-160 227 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF EXTREME COLD EXPOSURE ON ADRENOCORTICAL FUNCTION IN THE UNANESTHETIZED DOG.
Research rept., vol. 13, p. 835-842,
by Richard H. Egdahl and John B. Richards. 1 Dec 55, 12p
Proj. NM007 081 22 05

Unclassified report

Descriptors: (*Adrenal cortex hormones, Exposure), (*Exposure, Adrenal cortex hormones), Tolerances (Physiology), Pituitary hormones, Corticosteroid agents, Secretion, Adrenal glands, Pituitary gland, Exposure, Stimulation, Dogs.

Unanesthetized dogs with cannulas in the right lumboadrenal vein were subjected to environmental temperatures of -47 and -79 degrees C. for 5 and 30 hours. Adrenal venous blood samples were collected prior to and during the period of cold exposure and examined for their content of 17-hydroxycorticosteroids. At both temperatures an immediate increase in adrenal corticoid output occurred and persisted for 1 to 3 hours. After that time the steroid secretion returned to control, pre-exposure levels, despite continued exposure, but the adrenals remained responsive to exogenously administered ACTH. Healthy dogs exposed to temperatures of -47 degrees C. for 30 hours and -79 degrees C. for 5 hours did not become hypothermic. (Author)

PB-160 228 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF INTESTINAL IRRIGATION ON BLOOD METHANOL.
Rept. no. 5,
by John E. Gajewski, V. A. Richardson, and W. R. Alsdorf, Jr. 22 Jun 48, 8p
Proj. NM007 031

Unclassified report

Descriptors: (*Intestines, Purification), (*Alcohols, Blood chemistry), Excretion, Nitrogen, Peritoneum, Cannulation, Toxic tolerances, Alcohols, Dogs, Rabbits.

Intestinal irrigation with Tyrode's solution at a rate of 1000 to 1200 ml. per hour over a period of eight hours, brought about an average reduction in the blood methanol level of 65.6 per cent in comparison to 22 per cent in untreated dogs. (Author)

PB-160 229 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF PERITONEAL IRRIGATION ON EXPERIMENTAL METHYL ALCOHOL TOXICITY.
Rept. no. 3,
by William S. Blakemore, Charles H. Hine, and Thomas E. Shea, Jr. 22 Apr 47, 12p
Proj. NM007 031

Unclassified report

drying, Histological techniques, Stress (Physiology), Surgery, Tissues (Biology), Dogs.

Elongation resulting from variable longitudinal stress was measured in a series of normal aortae and fresh and freeze-dried aortic grafts after periods of implantation from one week to one year. Fresh grafts show a progressive loss of elasticity, so that as elapsed time after implantation increases, the elasticity curves approach the curve of fibrous tissue per se. This is correlated with fibroplasia. These changes appear to stabilize at about six months after operation. No evidence of muscle contraction was seen. Freeze-dried grafts, both before and after implantation, give no evidence of muscle function. There is loss of elasticity, at all tension ranges, after only one week of implantation. There is a further slight progressive loss of elasticity, until six weeks after implantation; this loss coincides with healing and fibrous replacement. However, there is no further loss of elasticity for at least one year after implantation. This agrees with the observation of minimal peri-advential fibrosis. Therefore, the freeze-dried grafts after six weeks or more of implantation have elongation curves nearer normal than do fresh grafts. This would have theoretical clinical advantages in lessening the probability of rupture or aneurysm formation. (Author)

PB-160 414 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
STIMULATION OF ERYTHROPOIESIS IN IRRADIATED DOGS AND RATS.
Research rept., vol. 13, p. 251-258,
by Frederick Stohlman, Jr., E. P. Cronkite, and George Brecher. 23 May 55, 10p
Proj. NM006 012 05 14
AD 71 586

Unclassified report

Descriptors: (*Radiation effects, Hemopoietic system), (*Hemopoietic system, Stimulation), Erythrocytes, Sublethal dosage, Anoxia, Hemorrhage, Blood counts, Hematocrit, Bone marrow, Radiation injuries, Dogs, Rats.

The depression of erythropoiesis after sublethal doses of X-ray (150 r dogs and 200 r rats) and its subsequent stimulation by procedures that produce temporary anoxia bleeding before and after irradiation or para-aminopropiophenone (PAPP) was studied in 12 dogs and 30 rats. Erythropoietic activity was measured by reticulocyte counts, iron uptake, and hematocrits. The doses of radiation used depressed erythropoiesis as was expected. In dogs and rats the bleeding shortly before or after irradiation markedly increased the rate of recovery in erythropoiesis. Blood loss 24 hours after irradiation had no appreciable effect. The data indicates that recovery from injury to the erythropoietic system can be significantly accelerated, presumably by release of erythropoietic factors by anoxia without obviously accelerating the recovery of other bone marrow elements. The stimulus appears to lose its effectiveness within 24 hours in rats. (Author)

PB-160 416 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
STUDIES IN DIFFUSION RESPIRATION,
by G. T. Shires and S. W. Eyer. 14 Jun 50, 24p
Proj. NM001 056 03 01

Unclassified report

Descriptors: (*Respiration, Diffusion), (*Diffusion, Respiration), Life support, Oxygen, Nitrogen, Carbon dioxide, Blood pressure, Anoxia, Hypotension, Urine, Central nervous system, Heart, Acidosis, Blood circulation, Anesthesia, Dogs.

Diffusion respiration was studied in anesthetized dogs. It was shown that maintenance of life in the absence of respiratory movements is possible in the dog under certain conditions. These conditions are fundamentally (a) an open airway, (b) denitrogenation, (c) an external source of oxygen at atmospheric pressure. Anuria accompanies diffusion respiration in the absence of anoxia, hypotension, central nervous system depression, hypercarbia, and respiratory acidosis. This anuria is prevented by renal denervation. Diffusion respiration is accompanied by a fall in cardiac output, with a stable blood pressure and normal constant heart rate. (Author)

PB-160 438 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
A STUDY OF ELECTRICAL POTENTIAL DIFFERENCES ACROSS THE NORMAL AORTA AND AORTIC GRAFTS OF DOGS.
Research rept., vol. 11, p. 69-98,
by Philip N. Sawyer and James W. Pate. 19 Jan 53, 50p
Proj. NM007 081 10 06

Unclassified report

Descriptors: (*Transplantation, Aorta), (*Aorta, Voltage), Freeze drying, Potentiometers, Electrometers, Blood vessels, Tissues (Biology), Thrombosis, Preservation, Histological techniques, Mathematical analysis.

The aortic wall has an electric potential difference with the aortic intima normally negative in the respect to the adventitia. The magnitude of this P.D. is -1 to -5 millivolts in the normal vessel. Injury can vary or destroy this normal potential, the intima often becoming highly positive with respect to the adventitia. Fresh and freeze-dried grafts have basic electrical differences: (a) Before implantation, all fresh grafts have a P.D. This may or may not be an injury potential depending on trauma, time and temperature. After implantation, the P.D. of a fresh graft has many repeated peaks in potential, the magnitude and polarity of which may be correlated with thrombosis. (b) The freeze-dried graft has no electrical potential difference after reconstitution in physiological saline. After implantation no P.D. is shown by the freeze-dried graft until 14 days after operation, when a very low P.D. of normal polarity develops. No injury potentials have been found. Mathematical analysis of the data indicate that the freeze-dried graft reacts relatively little with its recipient aorta, while the fresh graft does react with the recipient aorta and both inter-react with the surrounding tissue. The measured P.D.'s seem to be a result of the dynamic interplay between the EMF's of the recipient aorta, the graft and the surrounding tissue. (Author)

PB-166 260 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval Applied Science Lab., Brooklyn, N. Y.
RESEARCH ON THE TEMPERATURES OF RAT SKIN ASSOCIATED WITH NUCLEAR WEAPON THERMAL BURNS.
Final rept.,
by G. P. deLhery, W. L. Derksen, and T. I. Monahan.
20 Feb 59, 28p
Proj. NS081 001
NASL 5046 16 P5; AFSWP 1109

Unclassified report

Descriptors: (*Skin, Thermal radiation), (*Thermal radiation, Skin), Rats, Burns, Nuclear weapons, Temperature, Protective clothing.

The protection afforded by various uniforms against the intense thermal radiation associated with nuclear weapons, using rat skin as a control was investigated. The temperature histories of irradiated rat skin were measured on anesthetized rats, uncovered as well as in

species of animals. The toxicity of the carrier gallium limits the radiation dosage of Ga(72) so that the only effect of radiation observed was transitory reduction of leucocytes. A reduction of total leucocytes in the mouse, rabbit and guinea pig have been produced at dosages of 2.3 to 9.0 mc Ga(72)/kg. The degree and duration of the leukopenia varies with the dose and species. Repeated injection of dogs and rabbits with gallium citrate indicates that this element is a cumulative poison for which these species cannot develop a tolerance. Subacute doses repeated twice weekly produced lethal results within four weeks. The final injection produced the typical results of an acutely toxic dose. In the dog, repeated injections of gallium citrate produced an exfoliating dermatitis which may appear several weeks after stoppage of the injections. Methods for the estimation of both total body radiation and individual tissue dose, as delivered by Ga(72) citrate, are given. (Author)

PB-160 247 Div. 16
OTS Prices: HC $3.00/MF $0.75

Naval Medical Research Inst., Bethesda, Md.
THE ELASTICITY AND STRENGTH OF SOME LONG BONES OF THE HUMAN BODY,
by Charles O. Carothers, Frank C. Smith, and Paul Calabrisi. 6 Oct 49, 64p
Proj. NM001 056 02 13

Unclassified report

Descriptors: (*Bone, Compressive properties), (*Elasticity, Bone), Humans, Legs, Strength, Brittleness, Rats.

Twenty-three compression tests were made on specimens machined from the shafts of 14 femurs, 8 tibias and 1 fibula removed from dissecting room cadavers. The average compressive strength of 19 of these specimens was 25,400 lb/square inch, and the average Young's Modulus in compression for 22 of these specimens was 2.73 x 1,000,000 lb/square inch. The average specific gravity of these specimens was 1.967. Eleven tensile tests made on specimens machined from 10 femurs gave an average tensile strength for the bone of 22,000 lb/square inch. Compression tests made on five whole femurs in which the direction of the applied load was approximately the same as that applied to the femur in the erect standing position gave an average compression of these bones of 1990 pounds. All the femurs but one failed by a transverse crack through the neck. Four whole femurs were tested in torsion and gave an average maximum torsional strength of 449 lb in. All these femurs failed by a combination of spiralling and longitudinal splitting of the shaft. (Author)

PB-160 249 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
EMERGENCY LABORATORY ORGANIZATION FOR THE CARE OF LARGE NUMBERS OF HUMAN BEINGS ACCIDENTALLY EXPOSED TO IONIZING RADIATION.
Research rept., vol. 13, p. 821-834,
by C. R. Sipe, P. K. Schork, C. P. A. Strome, and William H. Gibbs. 18 Nov 55, 14p
Proj. NM006 012 04 91

Unclassified report

Descriptors: (*Medical laboratories, Health physics instrumentation), (*Health physics instrumentation, Medical laboratories), (*Radiation injuries, Medical examination), Radioactive fallout, Laboratory equipment, Blood counts, Leukocytes, Blood platelets, Hematocrit, Bone marrow, Decontamination, Medical personnel, Radiation monitors.

The accidental exposure of a group of Marshallese and Americans to radioactive fallout in the spring of 1954 necessitated organizing and equipping an emergency medical team for the purpose of conducting essential laboratory and clinical examinations on the exposed individuals. This report is concerned primarily with the materiel, facilities, and personnel required for emergency laboratory analyses in an operation of this kind. Details of laboratory requirements and procedures used in examining a large number of individuals under circumstances necessitating a maximum of information with a minimum of equipment and trained personnel are presented. Basic organization for routine clinical observation is also included. This outline may provide a basis for future planning in the organization and equipment of similar medical teams and will no doubt be helpful in eliminating unnecessary delay in providing medical care to exposed individuals. (Author)

PB-160 398 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
SOME EFFECTS OF CORTISONE ON AORTIC GRAFTS. ADDENDUM: THE FATE OF ARTERIAL GRAFTS IN DOGS RECEIVING NO MEDICATION.
Research rept., vol. 10, p. 735-758,
by J. R. Barberio, James W. Pate, Philip N. Sawyer, and C. A. Hufnagel. 17 Nov 52, 24p
Proj. NM007 081 10 04

Unclassified report

Descriptors: (*Transplantation, Cortiscosteroid agents), (*Corticosteroid agents, Transplantation), (*Aorta, Transplantation), Surgery, Thrombosis, Pathology, Hemorrhage, Tissues (Biology), Elasticity, Histological techniques, Antigens and Antibodies, Dogs, Muscles, Freezing, Reliculoendolhelial system, Blood vessels, Connective tissue.

The present study was undertaken to determine the effect of cortisone on aortic homografts in the dog. Fresh and frozen aortic homografts were implanted in 21 dogs; 10 received cortisone and 11 were used as controls. Cortisone-treated animals had an increased mortality rate. They showed less connective tissue reaction, both grossly and microscopically. There was objective evidence of decreased healing. Cortisone had no demonstrable effect on the frequency or extent of thrombosis in the grafts. Reendothelialization was apparently normal in rate. Condensation of the elastic fibers and degeneration and phagocytosis of the graft muscle cells was reduced. Cortisone under the conditions of this experiment exerted no beneficial effect on aortic homografts. Some undesirable side effects were seen. ADDENDUM: In general, all arterial grafts ultimately die and are replaced by fibrous tissue from the recipient. The single exception to this is an autograft, in which case, many of the surface cells apparently survive. These are the cells which may receive nutrition by direct osmosis or diffusion. Most homografts, at three days after operation, are completely lacking in intima. After loss of the intima, there is an ingrowth of fibroblasts and endothelium from the adjoining recipient aorta. (Author)

PB-160 399 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
SOME ELASTIC CHARACTERISTICS OF FRESH AND FREEZE-DRIED AORTIC GRAFTS.
Research rept., vol. 11, p. 785-798,
by James W. Pate and Philip N.Sawyer. 27 Jul 53, 14p
Proj. NM007 081 10 09

Unclassified report

Descriptors: (*Transplantation, Aorta), (*Aorta, Transplantation), (*Elasticity, Aorta), Collagen, Freeze

Descriptors: (*Strategic warfare, Simulation), (*Armed forces operations, Game theory), (*Computers, Simulation), Oerations research, Feasibility studies, Decision making, Programming languages, Programming(Computers), Probability, Communication theory, Military tactics, Input-output devices, Computer storage devices, Targets, Weapons, Ordnance.

Military planners need techniques that may be used to test new ideas for Army equipment, organizations, tactics, and doctrine early in the developmental cycle, prior to substantial investments in prototype equipment or in reorganization or retraining. The development of the CARMONETTE model was therefore undertaken to provide a method for testing these ideas operationally in an environment of simulated combat. The CARMONETTE development program began with a feasibility study in which a somewhat simpler model of combat was programed for the ERA 1101 computer. This study, though limited in scope, indicated that the computer-played combat simulation had considerable promise as a tool for military operations research. The success of the feasibility study led to a decision to produce a much more sophisticated model that could be used not only to test new ideas, as described above, but also to measure the combat potential of present and proposed company-level units and to use the data thus obtained as input for higher-level war-gaming studies.

AD-444 755 Div. 18, 30, 32
OTS Prices: HC $3.00/MF $0.75

Research Analysis Corp., McLean, Va.
A CODING SYSTEM FOR DESCRIBING FACTORS RELATED TO MILITARY OPERATIONS,
by Louis C. Peltier. May 64, 96p RAC-TP-118
Contract DA44 188AR01

Unclassified report

Descriptors: (*Armed forces operations, Programming (Computers)), (*Programming (Computers), Armed forces operations), Information retrieval, Data processing systems, Data storage systems, Simulation, Handbooks.

The aim of the research is to present by means of coding tables an improved and expanded system of organizing information descriptive of factors bearing on military operations for use in research. Several environmental coding handbooks and lists of environmental factors pertinent to military activities have been prepared in the past. Cross correlations between environmental and/or operational factors and the effects they induce have been limited in effectiveness because the lists of factors considered have been inadequate. In the interests of keeping the study simple, reducing the number of measurements or observations, or because appropriate scales of measurement did not exist, the tendency has been to give most attention to the simple environment-and-response relation and comparatively little to more complex relations such as that of the mission-environment-organization-tactics-response combination.

PB-166 319 Div. 18, 2
OTS Prices: HC $1.00/MF $0.50

Research Analysis Corp., McLean, Va.
A MATHEMATICAL MODEL OF TERRAIN SHIELDING,.
Staff paper,
by Robert R. Hare, Jr. May 57, 22p RAC-SP-19
Contract DA44 188AR01
AD 137 406

Unclassified report

Descriptors: (*Mathematical models, Terrain), (*Terrain, Effectiveness), (*Targets, Safety), Fragmentation, Weapons, Vulnerability, Countermeasures.

In the evaluation of fragmentation-weapon effectiveness against targets on the ground it is important to be able to estimate the amount of cover afforded the targets by terrain. This cover depends not only on the nature of the terrain, but also on the height of burst of the fragmenting weapon, the size of the target, and the distance of the target from the burst. In this study the amount of cover provided by terrain was expressed by a ground-cover function, which estimates the expected fraction of a target that is exposed to fragments from a burst. A simple theory of ground-cover functions was developed; and two applications of the theory, the cover provided by representative open fields and that provided by forests, were investigated. No consideration was given in this study to large fluctuations in terrain, such as hills and valleys, since the effect produced by a single fragmenting weapon is generally restricted to a small area. Instead, the objective was to investigate the effect on weapon effectiveness of small terrain variations and other obstacles to fragment travel.

PB-166 320 Div. 18
OTS Prices: HC $2.00/MF $0.50

Research Analysis Corp., McLean, Va.
EFFECT OF POPULATION MOBILITY ON THE LOCATION OF COMMUNAL SHELTERS.
Staff paper,
by Michael N. Alexander, J. Brooks Ferebee, Paul J. Grim, Leonard S. Lebow, and Stephen D. Senturia.
Oct 57, 44p RAC-SP-30
Contract DA44 188AR01
AD 204 090

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Shelters, Urban areas), (*Civil defense, Shelters), Nuclear warfare, Warning systems, Population, Underground structures, Time studies, Buildings, Housing, Survival, Probabilities.

Variations in warning time have a marked effect on the size of the area that can be served by one shelter when the percentage of persons capable of reaching the shelter is held constant. Before a shelter program is designed for any area, additional data are needed concerning the rates of emptying different types and heights of buildings, the rates of movement on streets with varying degrees of crowding, and the distribution of the population among the various types and heights of building. A residential-shelter district containing 50 acres is the maximum size that will allow virtually 100% of the population to reach the shelter if the warning time is 15 min. In some commercial districts it is impossible to empty all buildings in the given warning time. This means that if the shelters are to be located outside existing buildings some persons will be unable to reach them. In a residential district one entrance unit for each 550 persons is the minimum required to allow all persons to enter the shelters; one entrance unit for each 250 persons is required to avoid the formation of a queue. Approximately 400 shelters varying in individual capacity from 650 to 9,000 persons is required to provide shelter for all residents of Washington, D. C.

PB-166 321 Div. 18, 15
OTS Prices: HC $3.00/MF $0.75

Research Analysis Corp., McLean, Va.
CARMONETTE: A CONCEPT OF TACTICAL WAR GAMES.
Staff paper,
by Richard E. Zimmerman and Joan F. Kraft.
Nov 57, 58p RAC-SP-33
Contract DA44 188AR01
AD 204 089

Unclassified report

contact with the Hot-Wet uniform. The rats were irradiated by exposure to a modified 24-inch carbon-arc searchlight whose irradiance was attenuated to simulate the thermal pulse of nuclear weapons having a wide range of yields.

PB-166 261 Div. 16, 14
OTS Prices: HC $1.00/MF $0.50

Naval Applied Science Lab., Brooklyn, N. Y.
THERMAL AND OPTICAL PROPERTIES OF THE NML SKIN SIMULANT.
Final rept.,
by Willard L. Derksen, Guy P. Delhery, and Thomas I. Monahan. 18 Jan 60, 18p
SF001 05 11
NASL 5046 3 P122; DASA 1169

Unclassified report

Descriptors: (*Radiation injuries, Skin), (*Skin, Simulation), Radiation effects, Nuclear exposions, Clothing, Heat transfer, Polyethylene plastics, Amino plastics, Silicon compounds, Surface temperatures, Thermal radiation, Optical properties, Thermal properties.

A simulant for human skin in studies of burns caused by thermal radiation has been developed. The temperature history of an embedded thermocouple is employed to correlate with burn severity. By varying the amount of urea formaldehyde resin and silica powder the surface temperatures of the blackened skin simulant, when irradiated, were made to equal those of human skin similarly exposed. The radiant and spectral reflectance and the diathermancy of the simulant are very similar to those of human skin. (Author)

PB-166 275 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Applied Science Lab., Brooklyn, N. Y.
A METHOD FOR CALIBRATING RETINAL-BURN SOURCES.
Final rept.,
by H. Korbel and W. L. Derksen. 15 Mar 60, 12p
NASL 5046 16, P10; DASA 1178

Unclassified report

Descriptors: (*Radiation effects, Retina), (*Retina, Radiation effects), Thermal radiation, Burns, Eye, Lenses, Nuclear explosions, Calibration, Mathematical analysis.

A method is described for finding the irradiance distribution on the retina of a whole eye which a given retinal-burn source will provide. The method consists of locating at the eye position a lens whose aperture is equal in size to the pupil of the eye, and then exploring the radiation flux distribution at a certain distance behind the lens. This distribution will be the same as that on the retina, except for a known magnification factor. (Author)

17. Metallurgy

AD-422 498 Div. 17
OTS Prices: HC $7.00/MF $1.50

General Electric Co., Cincinnati, Ohio.
MATERIALS PROPERTY DATA COMPILATION.
PART I: CAST UDIMET 500 AND WROUGHT UDIMET 500.
Quarterly rept. no. 7,
by R. J. Favor and H. G. Popp. 1 Nov 63, 324p
Contract AF33 657 8017

Unclassified report

Descriptors: (*Nickel alloys, Mechanical properties), Chromium alloys, Cobalt alloys, Molybdenum alloys, Aluminum alloys, Titanium alloys, Castings, Mechanical working, Tensile properties, Rupture, Creep, Fatigue (Mechanics), Metal coatings, Recrystallization, Rolling (Metallurgy), Welds, Welding.

Compilation of reports containing mechanical properties on Udimet 500 are included. Mechanical properties reported are tensile, rupture, creep, fatigue and miscellaneous other properties. (Author)

PB-166 259 Div. 17, 25
OTS Prices: HC $3.00/MF $0.75

Illinois Univ., Urbana.
AN ANALYSIS OF NOTCHED UNIAXIAL FATIGUE DATA.
Rept. for 1 Mar 53-1 Apr 54,
by William E. Dirkes. Mar 55, 62p
Proj. 7360, Task 73605
WADC TR54 462; AD 067 336

Unclassified report

Descriptors: (*Fatigue (Mechanics), Metals), (*Metals, Fatigue (Mechanics)), Test methods, Stresses, Aluminum alloys, Steel, Data.

An analysis of the failure trends of fatigue data is presented in terms of the nominal applied stresses. Fatigue failure stresses are related to the maximum tensile stresses applied to test specimens. The concepts presented are used as a means of expressing notched specimen test results as functions of unnotched specimen characteristics. Test data for 2014-T6(14S-T6) and 2024-T4(24S-T4) aluminum alloys and SAE 4130 steel were taken from WADC TR 52-307 and NACA TN 2639 for use in this analysis. The test data available are in agreement with the concepts presented; however, additional data are required to prove the analysis. Data for failure of unnotched fatigue specimens are used as the basis for the development of a method for predicting fatigue test data for notched specimens by a semi-graphical method. Fatigue strengths for notched specimens can be predicted for various mean strengths from tensile test data, fatigue data for unnotched specimens, and a single SN curve for notched specimens. The method as presented is limited to ductile materials tested with axially applied loads and is applicable for fatigue strengths determined for large numbers of cycles. (Author)

18. Military Sciences and Operations

AD-257 012 Div. 18, 15, 30
OTS Prices: HC $6.00/MF $1.50

Research Analysis Corp., McLean, Va.
CARMONETTE: A COMPUTER-PLAYED COMBAT SIMULATION,
by Hebron E. Adams, Richard E. Forrester, Joan F. Kraft, and Barbara B. Oosterhout. Feb 61, 264p
RAC-T-389
Contracts DA44 188AR01 and DA44 109qm266

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Dosimeters, Glass), (*Glass, Dosimeters), (*Radiation measurement systems, Glass), Optical properties, Ionization, Discoloration, Optical phenomena, X-rays, Gamma rays, Attenuation, Photometers, Calibration.

It has been determined that the phenomenon of glass discoloration by ionizing radiation can be used for quantitative measurements of gamma or X-ray dose. Numerous glasses were investigated and Corning Vycor glass was found to have suitable characteristics to cover the dose range of 500 to 3 million roentgens. It is used in the form of rods of 3/8-inch diameter and lengths of 1/4, 1, and 3 inches. The optical density measured through the axial length is proportional to the incident dose. The energy response is flat above 150 KEV when exposed in aluminum tube holders primarily designed for physical protection. The most serious source of error is caused by the exponential time-fading of the induced discoloration which must be considered in the calibration. Complete bleaching after exposure is acquired by heating the dosimeter to 400 degrees C., thus permitting its reuse. These dosimeters have been used for gamma ray dose surveys in the laboratory and in the field at atom bomb tests. The method has proved to be simple, economical, and rugged, with an over-all accuracy of about ± 5 percent. (Author)

21. Nuclear Propulsion

No Entries

22. Ordnance

AD-299 061 Div. 22
OTS Prices: HC $1.00/MF $0.50

Bureau of Mines, Pittsburgh, Pa.
INITIATION OF DETONATION RESULTING FROM COMBUSTION INSTABILITIES.
Quarterly rept. for 1 Nov 62-31 Jan 63,
by F. C. Gibson, R. W. Watson, C. R. Summers, and F. H. Scott. 13 Mar 63, 26p
ARPA Order 44 62

Unclassified report

Descriptors: (*Detonations, Explosive materials), (*Explosive materials, Detonations), (*Propellants, Shock waves), Attenuators, Thickness, Aluminum, Boosters, Combustion, Stability, Explosives initiators.

The report represents research performed in the field of initiation and growth of detonation in explosives and propellants; a prime area of interest involves the study of initiation mechanisms in an explosive system that is capable of undergoing either high-order detonation or a low-velocity reaction as a result of multiple low amplitude shocks that may occur in propellants as a result of combustion instability. Current emphasis is placed on the low-order regime. Experimental studies in this area are directed toward a description of this phenomenon in terms of the initial state of the explosive, the character of the initial stimulus, and subsequent interactions occurring in the system. (Author)

AD-406 438 Div. 22
OTS Prices: HC $1.00/MF $0.50

Bureau of Mines, Pittsburgh, Pa.
INITIATION OF DETONATION BY LOW AMPLITUDE SHOCKS.
Quarterly rept. for 1 Feb-30 Apr 63,
by F. C. Gibson, R. W. Watson, C. R. Summers, F. H. Scott, and E. J. Hay. 28 May 63, 24p
ARPA Order44 63
N63 17391

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Detonations, Shock waves), (*Explosive materials, Detonations), Propellants, Liquids, Chemical reactions, Attenuators, Aluminum.

The report concerns research conducted in the field of initiation and growth of detonation in explosives and propellants with particular emphasis placed on reactions resulting from initiation by low-amplitude shocks. These reactions have been referred to as low-velocity detonation; although such reactions are about as destructive as the better understood hydrodynamic-thermodynamic detonation, considerably less is known about them. The area of immediate interest is in the study of the behavior of a liquid explosive during the period between the application of the initial shock and subsequent reactions. (Author)

AD-408 471 Div. 22
OTS Prices: HC $1.00/MF $0.50

Michigan Univ., Ann Arbor.
EFFECT OF DELAY TIME AND NUMBER OF DELAYS ON THE SPECTRA OF RIPPLE-FIRED SHOTS.
Scientific rept., no. 5,
by Henry N. Pollack. Mar 63, 25p ORA-3649-16-S, ORA-3708-18-S
Contracts AF19 604 6642, AF49 638 911, Proj. 7639, Task 73696
AFCRL 63 296; N63 17633

Unclassified report

Earthquake Notes, Mar 63, v. 34, no. 1.

Descriptors: (*Detonations, Time), (*Explosion effects, Time), Blast, Fourier analysis, Seismic waves, Sound signals.

Quarry operators often find it advantageous to fire multiple hole blasts with time delays between each hole. This practice, in blaster's parlance, is known as ripple firing. One effect of time delays between shots of a multiple hole blast is to impart to the seismic signal of periodicity which invites analysis by Fourier techniques. This paper investigates the effect of delay time and number of delays on the spectra of ripple-fired blasts. (Author)

AD-422 374 Div. 22, 15
OTS Prices: HC $1.00/MF $0.50

Research Analysis Corp., McLean, Va.
A BEGINNING TO COST-EFFECTIVENESS ANALYSIS,
by Eugene P. Visco. Aug 63, 18p RAC-TP100
Contract DA44 188AR01

Unclassified report

Presented at the National Meeting of the Operations Research Society of America (23rd), 27 May 1963, in Cleveland, Ohio.

Descriptors: (*Costs, Ordnance), (*Ordnance, Mathematical models), (*Programming (Computers), Ordnance), Linear programming, Operations research, Effectiveness, Probability, Simulation, Tanks (Combat vehicles), Weapons.

A method of cost-effectiveness analysis was developed to

Rept. of the TACSPIEL Study group.
Legibility of this document is in part unsatisfactory.
Reproduction will be made from best available copy.

Descriptors: (*Tactical warfare, Mathematical models), (*Game theory, Tactical warfare), (*Monte Carlo methods, Tactical warfare), Simulation, Warfare, Decision theory, Military strategy, Decision making.

CARMONETTE is a mathematical model of battle, of Monte Carlo type, which simulates in a simple straightforward manner, the step by step progress of an isolated battle. It is designed so that all the calculations may be carried out on standard general purpose digital computers, except that a limited number of high level decisions may be injected into the battle during the calculations. CARMONETTE consists of two parts. The first, which details the manner of simulation of the combat activities of the individual participants in each battle, is in a high state of development. The second part, which deals with the integration of these separate combat elements into sensible and meaningful battles, is less well established.

PB-166 322 Div. 18, 15
OTS Prices: HC $2.00/MF $0.50

Research Analysis Corp., McLean, Va.
FOE, A MODEL REPRESENTING COMPANY ACTIONS.
Technical paper,
by Dorothy Kneeland Clark, Lewis E. Keefer, and William W. Walton, Jr. Dec 60, 30p RAC-TP17
Contract DA44 188AR01
AD 254 156

Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Mathematical models, Warfare), (*Tactical warfare, Mathematical models), Game theory, Iterative methods, Numerical analysis, Programming (Computers), Military strategy.

The most significant improvement introduced in the FOE model described in this paper was the velocity factor, which represents the approach of the attacking force at a rate varying with intensity of battle. During the engagement the number of actual combatants in the forces involved build up from zero in proportion to the relative velocity with which the opposing forces are moving. Explicit treatment of each weapon type, together with the velocity factor, permits the introduction of fire from each weapon type only as it comes into range and also limits interchange of fire and resultant casualties to the areas within range at each time increment. The equations developed for FOE cannot be solved analytically but are solved by stepwise numerical iterations. For small increments of time the variables are assumed to be constant and the values for the t - 1 interval are applied to the tth interval to find a new set of values to be used in the next. Because of the uncertainty of input data and the level of aggregation employed it is felt that more refined techniques of numerical analysis are not warranted, and first-order differences only were considered. FOE, incorporated with the compatible CORG tank-antitank model, is being programed for the 1103A digital computer.

19. Navigation

AD-409 817 Div. 19, 1, 18, 25
OTS Prices: HC $3.00/MF $0.75

ITT Federal Labs., Nutley, N. J.
SOLID STATE TACAN RECIEVER/CODER.
Interim scientific rept.,
by N. R. Ascione, J. C. Cozzie, and R. E. Torregrossa. Mar 63, 70p
Contract AF19 604 8352
ESD TDR63 128; N63 18090

Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Air traffic control systems, Direction finding), (*Direction finding, Transponders), (*Transponders, Semiconductor devices), (*Semiconductor devices, Transponders), Range finding, Radio beacons, Radio equipment, Radio homing, Design, Intermediate frequency amplifiers, Identification systems, Automatic gain control, Decoding, Modules (Electronic), Timing circuits, Wiring diagrams.

The initial design of a receiver-coder for use as part of a solid-state TACAN transponder is discussed. Techniques developed for specific problem areas are covered, and experimental results obtained from a 'breadboard' model given. The possible implications of the program on future TACAN development are examined and recommendations made for the future course of development. (Author)

AD-410 919 Div. 19, 8, 18, 25
OTS Prices: None/MF $1.00

ITT Federal Labs., Nutley, N. J.
SOLID STATE TACAN MONITOR.
Final rept. no. 1,
by F. M. Griffee and J. B. Carocari. Mar 63, 132p ITTFL-54316
Contract AF19 604 8459
ESD TDR63 321

Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.
Document is available in microfiche only.

Descriptors: (*Air traffic control systems, Direction finding), (*Direction finding stations, Monitors), (*Monitors, Direction finding stations), (*Semiconductor devices, Direction finding), Modules (Electronic), Modulators, Power supplies, Delay circuits, Signal generators, Radiofrequency generators, Design, Alignment, Wiring diagrams, Catalogs.

The design of a solid state monitor for use as part of a TACAN ground station is given. A detailed description of the deliverable breadboard from both its physical and electrical aspects is provided, together with test results obtained to date and recommendations for further development. (Author)

20. Nuclear Physics and Nuclear Chemistry

PB-160 174 Div. 20, 18, 25
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
DEVELOPMENTAL STUDY OF THE USE OF VYCOR GLASS FOR GAMMA RAY DOSIMETRY.
Research rept., vol. 12, p. 147-166,
by Maynard Eicher. 17 May 54, 28p
Proj. NM006 012 04 69

Unclassified report

Descriptors: (*Integrated circuits, Semiconductors), (*Semiconductors, Integrated circuits), (*Molecular electronics, Semiconductors), Gallium alloys, Arsenic alloys, Lasers, Transistors, Single crystals, Semiconductor devices, Electrical properties, Light, Multiplex, Piezoelectric effect, Amplifiers, Ultrasonic properties, Oscillators, Thermal properties, Electrets, Silicon, Band-pass filters, Circuits, Manufacturing methods, Design.

New semiconductor phenomena and circuit approaches for extending the range of functions available in integrated circuits were investigated. The work was divided into six specific tasks; gaAs emission technology, light multiplexing, piezoelectric effects in semiconductors, thermal oscillators, silicon adaptive elements, and sampled-data filters.

PB-160 198 Div. 25
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
AN APPARATUS FOR THE RAPID DETERMINATION OF THE RELATIVE LUMINOSITIES OF FLUORESCENT SOLIDS PARTICULARLY APPLICABLE FOR FIELD WORK.
Rept. no. 3,
by Alfred A. Schiller and Louis P. Cecchini. 21 Jul 48, 32p
Proj. NM001 008

Unclassified report

Descriptors: (*Fluoresence, Luminescence), (*Luminescence, Fluoresence), (*Measuring devices, Luminescence), Photometers, Galvanometers, Mercury lamps, Textiles, Tests, Visual signals, Ultraviolet radiation, Communication equipment.

A simple apparatus consisting of a mercury lamp, photocell, filter and galvanometer affords a rapid method for measuring the relative luminosities of solid fluorescent materials. A group of 19 fluorescent fabrics used in visual communications were investigated with this equipment and their luminosities were found to differ by as much as 100 per cent. It was shown that the effects of prolonged UV irradiation, backings, and special manufacturing processes on the luminosities of the fluorescent fabrics could readily be measured by the apparatus. Luminosities obtained by this method showed an agreement of ± 4 per cent with luminosities obtained by more precise spectrophotometric measurements. The results were reproducible to within ± 3 per cent. (Author)

PB-160 208 Div. 25, 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
BLACK BODY RADIOMETER, A 4rr RECEIVER FOR MEASUREMENT OF TOTAL RADIATED HEAT OUTPUT,
by T. H. Benzinger and C. Kitzinger. 6 Oct 49, 48p
Proj. NM004 006 01 02

Unclassified report

Descriptors: (*Blackbody radiation, Measurement), (*Radiometers, Blackbody radiation), (*Heat production (Biology), Measurement), Body temperature, Thermal radiation, Heat transfer, Humans, Design, Performance (Engineering), Stability.

The principle of a 4 pi radiometer, enclosing a source of radiation in a black body is introduced for the measurement of total radiated heat output from irregular bodies. For the actual construction of a black body radiometer, special thermoelectric surface receivers were designed and built. Their essential characteristics are: stability against air movement obtained without shields or windows; stability against thermal disturbances; and, rapid response combined with rugged construction. Although the instrument is specifically developed for continuous recording of radiant heat loss and average skin temperature in studies on reflex temperature control of the human body, the general principle of the black body radiometer, or the special design of the receiver, may have other applications, in physics, meteorology, or engineering.

PB-166 212 Div. 25, 2, 20, 30
OTS Prices: HC $2.00/MF $0.50

SOVIET RESEARCH ON THEORETICAL PHYSICS.
Sep 64, 28p PAL-64-4

Unclassified report

Descriptors: (*Physics, Theory), Nuclear physics, Elementary particles, Field theory, Plasma physics, Solid state physics, Astrophysics, Relativity theory, Computers, Scientific research, USSR.

Contents:
Low-energy nuclear physics
Elementary particle physics and field theory
High-energy limits, Regge poles and cuts, and dispersion relations
Symmetry properties of strong interactions
Weak interactions
Plasma physics
Solid-state physics
Astrophysics
General relativity
Interaction between theoretical and experimental physics
Computers in theoretical physics research.

PB-166 265 Div. 25
OTS Prices: HC $2.00/MF $0.50

Hermes Electronics Co., Cambridge, Mass.
ADDITION THEOREMS FOR SPHERICAL WAVE FUNCTIONS.
Technical rept. no. 1,
by S. Stein. 15 Aug 59, 44p HEI-M-697
Contract Nonr2632 00
DASA 1155, AD 229026

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Special functions (Mathematical), Theorems), (*Electromagnetic waves, Scattering), Vector analysis, Polynomials, Series, Functions, Identities, Propagation, Electromagnetism.

Addition theorems are described for spherical vector wave functions, under both rotations and translations of the coordinate system. These functions are the characteristic solutions in spherical coordinates of the vector wave equation, such as occurs in electromagnetic problems. The vector wave function addition theorems are based on corresponding theorems for the spherical scalar wave functions. The latter are reviewed, and a discussion of the coefficients is included. (Author)

PB-166 283 Div. 25, 20
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A REVIEW OF SIMILITUDE THEORY IN GROUND SHOCK PROBLEMS,
by Blaine R. Parkin. 22 Apr 58, 54p RM-2173
AD 156 012

Unclassified report

Rept. on Proj. RAND.

evaluate specific items of Army equipment in mathematical terms, as part of the larger problem of optimum allocation of resources. The medium (now 'main') battle tank was selected as the leading item on a list of Army equipment chosen for 'criticality in combat.' A linear programming model for the Univac Scientific 1103A computer was set up to solve the problems of maximum combat effectiveness subject to dollar constraints and minimum cost subject to maintaining selected levels of combat effectiveness. Comparative combat effectiveness of US and enemy forces was considered to be the product of ratios of rates of fire, probabilities of hit, and probabilities of kill, given hit. Later, weighting procedures allowed consideration of other factors. The area that gave the greatest difficulty (and that requires the most future research) is that of measures of effectiveness. That difficulty, plus the application of a simplified programming model, qualifies the study's product as illustrative rather than factual. (Author)

PB-166 231 Div. 22
OTS Prices: HC $4.00/MF $0.75

Office of Scientific Research and Development. Div. 4.
SUMMARY, PHOTOELECTRIC FUZES AND MISCELLANEOUS PROJECTS.
Summary technical rept., vol. 3,
ed. by A. V. Astin. 1946, declassified 2 Aug 60,
126p STR-4-3
AD 221 589

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction will be made from the best available copy.

Descriptors: (*Proximity fuzes, Photoelectric effect), Radio proximity fuzes, Toss bombing, Bomb directors, Time delay fuzes, Rocket fuzes, Fuzes (Ordnance), Design, Test methods, Performance (Engineering), Aerial targets, Rockets, Mortar ammunition, Magnetic fields, Range finding, Radar, Guided bombs, Powder bags, Textiles, Phototubes.

Contents: Summary of Work of Division 4, Proximity and Time Fuzes, Photoelectric Fuze Development; Introduction and Summary, Basic Principles and Design of PE Fuzes by Alex Orden and R. F. Morrison, Description of Photoelectric Fuze Types by Charles Ravitsky, T. M. Marion, W. E. Armstrong, and J. G. Reid, Jr., Laboratory Methods for Testing T-4 Fuzes and Components by P. J. Franklin, Field Test Methods for PE Fuzes by Alex Orden, Evaluation of PE Fuzes by Alex Orden, Miscellaneous Projects of Division 4 by Clarence B. Crane, L. M. Andrews, T. N. White, and Robert D. Huntoon.

PB-166 281 Div. 22, 18
OTS Prices: HC $6.00/MF $1.50

Office of Scientific Research and Development. Div. 11.
FIRE WARFARE: INCENDIARIES AND FLAME THROWERS.
Summary technical rept., vol. 3,
ed. by Raymond H. Ewell. 1946, declassified 2 Aug 60,
296p STR-11-3
AD 221 598

Unclassified report

Descriptors: (*Flame warfare, Incendiary ammunition), (*Flamethrowers, Flame warfare), (*Incendiary bombs, Flame warfare), Incendiary mixtures, Fire bombs, Bomb components, Bomb clusters, Bomb cases, Flamethrower fuels, Tests, Test methods, Tanks (Combat vehicles), Antipersonnel weapons, Design, Theory, Incendiary gels.

This volume discribes the research and development work in the fields of incendiaries, flame throwers, and incendiary fuels carried on by the National Defense Research Committee. Chapters 1, 2, and 3 deal with incendiaries, Chapters 4, 5, 6, and 7 with flame throwers, and Chapter 8 with incendiary fuels.

PB-166 282 Div. 22, 4, 18
OTS Prices: HC $5.00/MF $1.00

Office of Scientific Research and Development. Div. 8.
THE PREPARATION AND TESTING OF EXPLOSIVES.
Summary technical rept., vol. 1,
ed. by A. H. Blatt. 1946, declassified 2 Aug 60, 196p
STR-8-1
AD 221 595

Unclassified report

Descriptors: (*Explosive materials, Preparation), (*High-explosive ammunition, Tests), Physical properties, Chemical properties, Chemical analysis, Test methods, Shaped charges, Detonations, Theory, Propellants, Propellent grains, Burning rate, Igniters, Aluminized explosives, Ammonium picrate, Explosive initiators, Flashless propellants, RDX, HMX, Plastic explosives, Torpex, Tracers (Ordnance), Cook off, Depth bombs, Explosion effects, Torpedo warheads, Chemical reactions, Nitramines, Nitrates, Esters, Aromatic compounds.

Contents:
Introduction
Preparation of High Explosives
The Properties of High Explosives
Applications of High Explosives
Experimental Studies of Explosive Phenomena
The Theory of the Detonation Process
Propellants
Tracers and Igniters
Glossary
Bibliography.

23. Personnel and Training

No Entries

24. Photography and Other Reproduction Processes

No Entries

25. Physics

AD-427 141 Div. 25, 8
OTS Prices: HC $7.90/MF $2.25

Texas Instruments, Inc., Dallas.
ADVANCED FUNCTIONAL ELECTRONIC BLOCK DEVELOPMENT,
by J. R. Biard and W. T. Matzen. Jan 64, 490p
TII-03-63-41
Contract AF33 657 9824, Proj. 4159, Task 415906
RTD TDR63 4203

Unclassified report

29. Quartermaster Equipment and Supplies

No Entries

30. Research and Research Equipment

PB-166 181 Div. 30
OTS Prices: HC $1.00/MF $0.50

RCA Defense Electronic Products, Princeton, N. J.
IMPLEMENTATION OF LARGE INFORMATION-RETRIEVAL PROBLEMS,
by Jack Minker. 7 Jul 61, 14p
Unclassified report

Presented at Gordon Research Conference, New Hampshire, 3-7 Jul 61.

Descriptors: (*Information retrieval, Programming (Computers)), Digital computers, Input-output devices, Programming languages, Computer storage devices, Dictionaries.

The report discusses an information retrieval application characterized by the process of incorporating new information into the data base of the information to be retrieved. For some classes of retrieval problems, the incorporation of new retrievable information into a system is rather difficult and has not yet received very much attention. The problem is characterized and specifications as to what can be accomplished on such problems to achieve an implementation at the end of one or two years are given.

PB-166 190 Div. 30
OTS Prices: HC $2.00/MF $0.50

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
A GROWING TREE FOR DESCRIPTOR LANGUAGE TRANSLATION,
by W. I. Landauer and N. S. Prywes. Jan 62, 28p
Contracts AF30 602 2382, Nonr551 40
Unclassified report

Presented at the Symposium on Symbolic Languages in Data Processing, Rome, Mar. 62.

Descriptors: (*Symposia, Programming languages), (*Programming languages, Data processing systems), Data storage systems, Information retrieval, Information theory, Control systems.

The impetus for using the Growing Tree structure as a stratagem for an efficient descriptor language translation stems from recent attempts to program computers for problems that require intelligence for their solution by humans. In these programs the entire structure of data evolves in the course of processing. Thus, it is necessary to have the program construct its own data structure dynamically. A major objective of the work presented in this paper is to facilitate communication, with a computer that is applied to information storage and retrieval problems and generally to simulation of cognitive processes. For an efficient operation of such a computer, it seems that one should be able to drop the information-carrying items into an automated file and then later be able to recall them by name. Such a process is desirable for a variety of applications where the items dropped may be the routines that compose a program library or that constitute the data belonging to a documentation file.

PB-166 273 Div. 30, 16, 20, 25
OTS Prices: HC $2.00/MF $0.50

Naval Applied Science Lab., Brooklyn, N. Y.
RADIANT HEAT SOURCES EMPLOYED IN THERMAL RADIATION STUDIES.
Final rept.,
by Jefferson A. Carter. 7 Jan 60, 38p
NASL 5046 2 P13; DASA 1173
Unclassified report

Descriptors: (*Thermal radiation, Laboratory furnaces), (*Laboratory furnaces, Thermal radiation), Carbon arc lamps, Reflectors, Nuclear explosions, Simulation, Nuclear warfare casualties, Burns, Eye, Retina, Searchlights, Laboratory equipment, Tungsten, Sources.

A general outline is presented of the development of arc-imaging and other high radiant flux sources for the laboratory study of the effects that high thermal radiation fluxes from atomic bomb explosions have upon various materials. The following devices are discussed: (1) a dual 24-in. carbon-arc furnace with paraboloidal reflectors; (2) a 24-in. carbon-arc furnace with an ellipsoidal reflector; (3) a laboratory thermal mechanism which produces a pulse equivalent to the thermal release of a nuclear detonation; (4) a dual 36-in. paraboloidal carbon-arc pulse furnace with a shutter and drive mechanism; (5) a wide area tungsten lamp source; (6) a double ellipsoidal carbon-arc image furnace; (7) ADL-strong arc imaging furnace; (8) the Carl Zeiss retinal lesion source; and (9) a proposed retinal burn furnace.

PB-166 274 Div. 30, 16
OTS Prices: HC $1.00/MF $0.50

Naval Applied Science Lab., Brooklyn, N. Y.
DEVELOPMENT OF A MAXWELLIAN-VIEW RETINAL-BURN DEVICE.
Final rept.,
by H. Korbel. 15 Feb 60, 18p
NASL 5046 16 P9; DASA 1175
Unclassified report

Descriptors: (*Medical research, Laboratory equipment), (*Burns, Laboratory equipment), (*Laboratory equipment, Burns), (*Retina, Burns), Lenses, Eye, Cornea, Nuclear explosions, Laboratory animals, Thermal radiation.

A simple device for producing retinal burns has been developed. Its advantages are that it can irradiate very large retinal areas, it gives uniform irradiance over that area, and it makes optimal use of whichever radiation source is used with it. The device consists of a large lens or mirror placed so as to form a real image of the radiation source. The eye to be exposed is located with its cornea at this real image, and the eye lens, if necessary with the aid of an auxiliary lens, focuses an image of the large lens or mirror itself upon the retina. (Author)

PB-181 567 Div. 30
OTS Prices: HC $1.25/MF $0.50

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS.
Oct 64
Unclassified report

Descriptors: (*Scientific research), (*Naval research),

Descriptors: (*Soil mechanics, Shock (Mechanics), (*Shock (Mechanics), Models (Simulations), Scale, Elasticity, Soils, Nuclear explosion damage, Airburst, Shock waves, Loading (Mechanics), Mathematical analysis, Stresses, Theory.

A brief review of some of the available data on the dynamic behavior of soils is followed by a similarity analysis of possible theories of soil dynamics. Results of this analysis are used to discuss the applicability of model scaling laws to the solution of ground shock problems. The usefulness of model studies as an aid in the evaluation of theories of soil dynamics is also noted. (Author)

26. Production and Management

AD-425 205 Div. 26, 14, 17
OTS Prices: HC $3.00/MF $0.50

Defense Documentation Center, Alexandria, Va.
MACHINING. A REPORT BIBLIOGRAPHY PREPARED BY DDC.
Rept. for 1953-Feb 64,
comp. by Angelo Muccino and Katye M. Gibbs.
Dec 63, 84p

Unclassified report

Prepared in cooperation with Metcut Research Associates, Inc., Cincinnati, Ohio.

Descriptors: (*Bibliographies, Machining), (*Machining, Bibliographies), Steel, Stainless steel, Nickel alloys, Cobalt alloys, Titanium alloys, Aluminum alloys, Magnesium alloys, Copper alloys, Refractory metal alloys, Beryllium alloys, Uranium alloys, Glass, Ceramic materials, Aluminum, Reports, Materials, Abstracting, Titanium, Beryllium.

This bibliography provides a guide to documents acquired by the Defense Documentation Center (DDC) that pertain to the subject of conventional and nonconventional machining. In preparing the bibliography, a comprehensive search was made by DDC to retrieve abstracts of all documents that might contain significant machining information. The abstracts were submitted for technical review and organization of the bibliography to the Machining Information Center, a department of Metcut Research Associates, Inc., Cincinnati, Ohio. Whenever a study of the abstracts left doubt as to whether the documents contained significant machining information, either DDC or the Machining Information Center reviewed the actual documents.

27. Propulsion Systems

AD-270 472 Div. 27, 12
OTS Prices: HC $7.00/MF $1.75

Kidde (Walter) and Co., Inc., Belleville, N. J.
STUDY OF INTEGRATED CRYOGENIC FUELED POWER GENERATING AND ENVIRONMENTAL CONTROL SYSTEMS. VOLUME III: POWER GENERATING EQUIPMENT STUDY,
by G. M. Hall and E. Treirat. Nov 61, 342p
Contract AF33 616 7508, Proj. 3145, Task 30328
ASD TR61 327 V3

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Manned spacecraft, Auxiliary power plants), (*Auxiliary power plants, Manned spacecraft), Control systems, Liquid rocket propellants, Liquefied gases, Hydrogen, Oxygen, Gaseous rocket propellants, Electrical power production, Hydraulic systems, Cryogenics, Turbines, External combustion engines, Space environmental conditions, Thermodynamics, Design, Iterative methods, Computers, Programming languages, Gears, Hydrazine, Analysis, Performance (Engineering).

This study evaluates the performance of various prime movers for manned space vehicle auxiliary power systems. Turbine and positive displacement engine type units operating on the combustion products of hydrogen and oxygen are analyzed. Performance comparisons are presented between various multistaged turbines and multiple expansion positive displacement engines. Consideration is given to the design and operation of required system components with the exception of driven accessories. Theoretical results indicate that the performance characteristics of axial, reentry, and hybrid turbines are essentially the same for an equal number of stages. Similarly, the performance of a four stage hybrid turbine is comparable with a triple expansion positive displacement engine. Using the performance results, system weights and volumes were determined for hydrogen-oxygen and hydrazine fueled systems. Based on this analysis, the hydrogen-oxygen system is lighter than hydrazine system for the complete mission spectrum covered. However, the hydrogen-oxygen system is 2-1/2 times the volume of the hydrazine system. (Author)

28. Psychology and Human Engineering

PB-160 127 Div. 28, 30
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
A MULTIPLE CHOICE BOX USING LIGHT AVERSION AS MOTIVATION,
by E. A. Jerome and J. P. Flynn. 6 Jun 50, 17p
Proj. NM000 019 01 01

Unclassified report

Descriptors: (*Psychology, Laboratory equipment), (*Laboratory equipment, Performance tests), (*Performance tests, Laboratory equipment), Psychology, Motivation, Learning, Confined environments, Light, Laboratory animals.

The choice box is divided into two identical chambers by a partition in which there are as many as five doors. One chamber is lighted, the other is not. An animal placed in the lighted chamber attempts to escape to the darkened one. After he has done so, he is given a brief fixed period in the dark at the end of which the lights in the previously-darkened chamber are turned on and those on the other side are turned off. The animal then returns to the original side and the cycle is repeated. The apparatus consists of three parts; the problem box, described above; the control mechanism, which operates a pair of lights and locks or unlocks doors in a precribed sequence; and the recording system, which yields a permanent record of the operation of the doors, the animal's attempts to open them and its successes. The advantages of this apparatus are: (a) a variety of selection problems can be presented in comparable situations and (b) the animals work at this sort of problem for considerable lengths of time without showing any diminution of drive. (Author)

systemic complexity are employed to order emergent systems within a total domain that is everywhere conformal with respect to the utilization of selective (or adaptive-control) processes for the attainment of viable organization and characteristic response. The resulting classification scheme--a unitary hierarchy incorporating (a) inorganic, (b) organic, and (c) conceptual systems--is, first of all, suggestive of further taxonomic refinement that will require the formulation of a continuous measure of systemic complexity. In a more significant development, however, this taxonomy leads to a conceptualization of a normative-theoretic approach to behavioral inquiry as a highly promising complement to the traditional objective-theoretic approach. If both projects--taxonomic refinement and theoretical reorientation--are carried forward in an iterative process, it is felt that a unitary format for general systems analysis can ensue as a fundamental rationale for the behavioral sciences. (Author)

PB-166 184 Div. 32
OTS Prices: HC $1.00/MF $0.50

Patent Office, Washington, D. C.
TOWARDS SEARCHING WITH ASSURED EXHAUSTIVE RETRIEVAL,
by Simon M. Newman. 30 Jul 60, 14p
Unclassified report

A contribution to the Conference, Federation Internationale de Documentation (26th), Rio de Janeiro, Brazil, 22-30 Jul 60.

Descriptors: (*Information retrieval, Data processing systems), Subject indexing, Reliability.

PB-166 186 Div. 32
OTS Prices: HC $1.00/MF $0.50

Patent Office, Washington, D. C.
CLASSIFIED PATENT SEARCH FILES: A PROPOSED BASE FOR TECHNICAL INFORMATION CENTERS,
by Simon M. Newman. Feb 61, 22p
Unclassified report

Prepared for presentation at the Meeting of the Delaware Valley Chapter, American Documentation Institute, 9 Mar 61.

Descriptors: (*Patents, Information retrieval), (*Information retrieval, Patents), Subject indexing, Classification, Libraries, United States government.

The search files of the U. S. Patent Office provide a carefully organized collection which contains the distilled essence of our technical know-how at each stage of evolution including each new development in every field. However, instead of being used to search for technical information, the files are primarily used to resolve legal questions of invention. Although a considerable number of knowledgeable research scientists and development engineers use the files constantly for a technical information center, this use should be vastly enlarged. Foreign countries, especially those behind the iron curtain, use their patent files to a much greater extent as technical information sources. The classification of the U. S. search files is more sophisticated, comprehensive and detailed, and has more professional effort devoted to its creation and maintence, than any other known system. The United States cannot afford to waste this major resource; its availability must be increased, and our scientists and engineers must be trained to use it. Tests should be made to determine its applicability to all literature in the field of applied technology. (Author)

PB-166 192 Div. 32
OTS Prices: HC $2.00/MF $0.50

Advance Information Systems Div., Hughes Dynamics, Inc., Sherman Oaks, Calif.
SEARCH STRATEGY BY REFERENCE LIBRARIANS.
Final rept., Pt. 3,
by G. Carlson. 17 Mar 64, 46p
Grant NSF C280
Unclassified report

Report on The Organization of Large Files, see also PB-166 197.

Descriptors: (*Information retrieval, Operations research), (*Libraries, Search theory), Statistical analysis, Selection, Professional personnel, Behavior, Reliability, Programming (Computers).

A study was made to describe in detail the search procedures used by reference librarians. The basic procedure was to present a search problem to a reference librarian and then record in detail his search techniques. An heuristic analysis was made of the observations. The result of the analysis is a flow chart with almost enough precision so that a computer program could be written directly from the charts. The flow charts lack accurate numerical values for some parameters and do not account for procedures which may have been omitted by the librarians. One of the most encouraging findings of the study is that human search behavior is quite regular. However, there are several particular inconsistencies.

PB-166 193 Div. 32
OTS Prices: HC $2.00/MF $0.50

Advance Information Systems Div., Hughes Dynamics, Inc., Sherman Oaks, Calif.
THE ORGANIZATION OF LARGE FILES: INTRODUCTION AND SUMMARY
Final rept., Pt. 1.
30 Apr 64, 28p
Grant NSF C280
Unclassified report

Descriptors: (*Information retrieval, Analysis), Data processing systems, Subject indexing, Tapes, Word association, Libraries, Language, Selection, Data storage systems, Reliability.

The study investigated various relationships between logical aspects of information retrieval (such as item representation and relevancy) and physical aspects (such as indexing structures and procedures for reorganization). Specifically, the study included: (1) operating library statistics on activity, (2) search strategy protocols of reference librarians, (3) procedures for file reorganization, (4) procedures for word association and file conversion, and (5) the measurement of file information and associated file organizations. The search strategy protocols demonstrated the extent to which reference librarians follow relatively well-defined heuristics, which can be applied not only to mechanical searching but to training of library personnel as well. The procedures for file reorganization were programmed and tested sufficiently to demonstrate effective capability for adjustment to environment. The word association concepts were flow charted and conversion procedures developed for application to the tape files of the Defense Documentation Center. The mathematics for measuring information from a file, particularly in terms of its relationship to relevancy, error, and index structure, was defined. (Author)

PB-166 194 Div. 32, 30
OTS Prices: HC $5.00/MF $1.00

Advance Information Systems Div., Hughes Dynamics, Inc., Sherman Oaks, Calif.
SELF-ORGANIZING PROCESSES -- COMPUTER PROGRAMS FOR FILES OF BIT PATTERNS.
Final rept., Pt. 4,
by Ralph M. Shoffner. 30 Apr 64, 188p
Grant NSF C280 Unclassified report

Volcanoes, Aerosols, Meteorological instruments, Astrophysics, Radio astronomy, Atmosphere, Atmospheric electricity, Radiation measurement systems, Chemistry, Lubricants, Soaps, Chemisorption, Helicoptors, Composite materials, Batteries and components, Electrodes, Fires, Rocket propellants, Mechanics, Strain gages, Non-destructive testing, Metallurgy, Refractory metals, Grain structures (Metallurgy), Hafnium, Crystal growth, Iron, Steel, Pressure vessels, Indium, Aluminum, Corrosion, Nuclear physics, Plasma oscillations, Radio, Antennas, Data processing systems, Space surveillance systems, Gas detectors, Cathodes (Electron tubes), Metal films, Lasers, Solid state physics, Fluorescence, Sound, Underwater sound, Patents.

Contents:
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Atmospheric aerosols near the Surtsey Volcano, by C. M. Gordon, E. C. Jones, and J. I. Hoover; The Fabry-Perot Refractometer and the precision NRL Lyman-Alpha Humidiometer, by F. C. Macdonald, D. L. Randall, and D. Stilwell.
Problem Notes: the mean distance to the moon as determined by radar; data from a system of atmospheric electricity stations; filter pack technique for classifying radioactive aerosols by particle size; performance characteristics of the FPP-15 filter material used in the USSR for environmental radioactivity monitoring; stabilization of silicone lubricating fluids at 300C to 400C by soluble cerium complexes; some physical properties of soap-solvent systems and their relation to the solubility parameter of the solvent; fundamental factors in detacting chemical as adsorbed films; field experience in recovering equipment and fuselage of HH 52A helicopter after submersion at sea; some surface chemical aspects of glass-resin composites; theoretical design of primary and secondary cells; X-ray diffraction studies of the working silver electrode; the NRL air resistance meter, Model II; 'twinned' extinguishants, purple-K powder and 'light water,' prove merit during simulated aircraft crash fires at NAS, Pensacola; the handling of accidentally released chlorine trifluoride-mixed hydrazine propellant; hole-drilling strain-gage method for nondestructive testing; defect structure in refractory metals; dendrite tip temperatures during rapid growth; experience in the high vacuum electron beam zone melting of hafnium; evaluation of perfection of copper single crystals grown by electron beam zone melting; effects of some alloying elements on the decomposition of cementite and graphitization kinetics in cast irons; apparatus for in-reactor fatigue testing of structural steels; new information on neutron embrittlement and embrittlement relief of reactor pressure vessel steels; polarographic determination of lead in indium; development of high strength structural steels; preliminary observations on the performance of 5086-H32 aluminum in sea water; effect of cathodic protection on crevice and pitting corrosion of 205, 304, and 316 stainless steel; rigorous treatment of the propagation and damping of small-amplitude plasma waves; impedance measurements on the hf antennas aboard the USS BELMONT; performance and evaluation tests of the TT-428 (XN-1)/UG paper tape reperforator-reader, the AN/UGC-23 (XN-1) page printer, and the AN/UGC-24(XN-1) page printer; electrodynamics in a magneto-ionic environment; first order oblateness perturbations and the U. S. Naval Space Surveillance System; decay prediction of 1963-21 using U. S. Naval Space Surveillance System observations; the computation of optimum orbital elements derived from a single coincident observation by two receiving stations of the Naval Space Surveillance System; temperature compensation and improvement of the NRL thermistor-bridge gas leak detector; protrusions on cathodes in electron tubes; source contamination effects on the epitaxy of Ge films on Ge; sealing techniques for gas laser tubes; Monte Carlo calculations for secondary fluorescence in the electron probe microanalyzer; computation of acoustic rays from temperatures measured in the deep ocean and prediction of the range to the convergence zone.
Published reports.
Papers by NRL staff members.
Patents.

31. Ships and Marine Equipment

No Entries

32. Miscellaneous Arts and Sciences

AD-297 176 Div. 32, 15
OTS Prices: HC $1.00/MF $0.50

Mitre Corp., Bedford, Mass.
RESOURCE ALLOCATION IN A PERT NETWORK UNDER CONTINUOUS ACTIVITY TIME-COST FUNCTIONS,
by E. B. Berman. 15 Aug 62, 22p TM-3308
Contract AF33 600 39852
ESD TDR63 206

Unclassified report

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Descriptors: (*Systems engineering, Mathematical models), (*Management engineering, Mathematical models), Time, Costs, Decision making, Equations, Iterative methods, Probability.

This memorandum describes a conceptual model which allocates resources in a PERT network, the activities of which are subject to continuous concave-upward time cost functions, in such a way as to achieve a minimum cost solution for a given completion date for the program described by the network. A parametric solution for the minimum cost solution at various total program times is also briefly described. The effect of uncertainty in the time of completion of an activity has also been investigated in a highly simplified model; and a tentative conclusion is presented that such uncertainty tends to divert resources toward the earlier part of the program, as compared to the solution under certainty. (Author)

AD-433 934 Div. 32
OTS Prices: HC $3.00/MF $0.75

Research Analysis Corp., McLean, Va.
THE DOMAIN OF ADAPTIVE SYSTEMS: A RUDIMENTARY TAXONOMY,
by Milton C. Marney and Nicholas M. Smith.
Sep 63, 64p RAC-TP-92
Contract DA44 188AR01

Unclassified report

Descriptors: (*Classification, Theory), Control systems, Management engineering, Decision making, Operations research, Human engineering, Behavior, Simulation, Stochastic processes, Social sciences.

Contrary to the usual supposition that the various behavioral sciences are concerned with quite disparate types of systems, this taxonomy presupposes a unitary format of organization and transformation derived on the basis of the concept of emergence. Rough measures of increasing

modified slightly to permit grammars of the type described in this paper, objections against the theory of such a grammar can be met. If this point can be shown, there is no need to introduce transformational rules into generative grammars of natural languages.

PB-166 206 Div. 32
OTS Prices: HC $1.00/MF $0.50

Ceskoslovenska Akademia Ved. Matematicky Ustav, Prague
ON SOME AXIOMATIC SYSTEMS FOR FORMAL GRAMMARS AND LANGUAGES,
by Karel Culik. 1 Sep 62, 12p

Unclassified report

Presented at IFIP Congress 62, Munich, Germany, 27 Aug-1 Sep 62.

Descriptors: (*Language, Analysis), Data processing systems, Vocabulary, Czechoslovakia.

33. Transportation

No Entries

Report on The Organization of Large Files, see also PB-166 192.

Descriptors: (*Programming (Computers), Information retrieval), (*Data processing systems, Data storage systems), Subject indexing, Classification, Distribution, Effectiveness, Communication theory, Analysis.

To provide an experimental vehicle for testing various procedures for file organization, various criteria for logical relationship, and various measures of performance, a 'bit-processor' was programmed which organizes a file of patterns of bits so as to automatically develop indexing structures which reflect skewed distributions of activity. The programs are designed to allow various subroutines, criteria, and measures to be changed. The programs were debugged and run sufficiently to demonstrate that they do in fact organize the file so as to be responsive to activity. (Author)

PB-166 195 Div. 32
OTS Prices: HC $3.00/MF $0.75

Advance Information Systems Div., Hughes Dynamics, Inc., Sherman Oaks, Calif.
SELF-ORGANIZING PROCESSES -- PROGRAMS FOR FILES OF WORD ASSOCIATIONS AND FOR CONVERSION OF DOCUMENT DESCRIPTIONS.
Final rept., Pt. 5.
30 Apr 64, 78p
Grant NSF C280

Unclassified report

Report on The Organization of Large Files, see also PB-166 194.

Descriptors: (*Data storage systems, Word association), (*Word association, Models (Simulations)), Information retrieval, Subject indexing, Tapes, Vocabulary, Data transmission systems, Operation, Programming (Computers).

To provide a vehicle for testing self-organizing procedures which would have some intuitive significance, a word association model was developed. This model is described and the flow charts for its operation presented. Flow charts for the conversion of the tape files of the Defense Documentation Center are also presented. (Author)

PB-166 196 Div. 32, 30
OTS Prices: HC $3.00/MF $0.75

Advance Information Systems Div., Hughes Dynamics, Inc., Sherman Oaks, Calif.
MEASUREMENT OF FILE OPERATING EFFECTIVENESS --TIME, COST, AND INFORMATION.
Final rept., Pt. 6,
by R. M. Hayes. 30 Apr 64, 62p
Grant NSF C280

Unclassified report

Report on The Organization of Large Files, see also PB-166 195.

Descriptors: (*Data processing systems, Effectiveness), (*Information retrieval, Analysis), Subject indexing, Search theory, Communication theory, Decoding, Operation, Time, Costs, Reliability.

A criterion for evaluation of a file organization, suitable for large files, is developed, based on response time, T cost, C , and a measure of 'information', I. The usual entropy measure for information is extended to include the relevancy of the information received as a significant parameter. The effect of errors in file operation is considered, and it is shown that these are best combatted by responding with a set of items rather than a single one. This is applied particularly in relationship to search strategy in an indexed file, in this way extending the methods of sequential decoding to file operation. To reduce the effective searching time, the techniques of activity organization can be used; these are quantitatively characterized. (Author)

PB-166 197 Div. 32, 16
OTS Prices: HC $2.00/MF $0.50

Advance Information Systems Div., Hughes Dynamics, Inc., Sherman Oaks, Calif.
ACTIVITY STATISTICS FOR A LARGE BIO-MEDICAL LIBRARY.
Final rept., Pt. 2.
30 Apr 64, 28p
Grant NSF C280

Unclassified report

Report on The Organization of Large Files.

Descriptors: (*Information retrieval, Operation), (*Libraries, Medical research), Subject indexing, Operations research, Statistical data, Functional analysis, Effectiveness, Distribution.

The study of library holdings and circulation statistics was undertaken to clarify the nature of the various distributions which were defined in a prior study (PB-166 193). The distributions defining this activity are: the variable concentration of file items which may be considered as reflecting past file activity; the worth of file items related to current activity; and the probable future activity on the file items. The prior study anticipated that there would be wide variations in the frequency of use of materials and of the importance of the materials which would be predictable through the distributions and would allow storage allocation of varying degrees of accessibility to achieve an efficient operation. It was further anticipated that the file could be characterized in terms of its utilization by individual users in order to provide multiple file access routes for the definable user groups. The results of the current study provided in this report indicate that a large degree of predictability is inherent in the file operations and that this predictability can be utilized to provide efficient operation. (Author)

PB-166 200 Div. 32
OTS Prices: HC $1.00/MF $0.50

Princeton Univ., N. J.
GENERATIVE GRAMMARS WITHOUT TRANSFORMATION RULES. A DEFENSE OF PHRASE STRUCTURE,
by Gilbert H. Harman. Dec 63, 22p

Unclassified report

Pub. in Language 1963, Oct-Dec, v. 39, no. 4, p. 597-616.

Descriptors: (*Language, Analysis), Specifications, Theory.

A phrase-structure grammar has been written which generates exactly the set of sentences generated by a fairly large transformational grammar written by Noam Chomsky. The phrase structure version of Chomsky's grammar is included in the appendix. It is written in an abbreviated notation which is explained. Chomsky and others have argued that a theory of language which supposes that the grammar of a natural language may be completely described by means of a phrase-structure grammar must be inadequate. They have also argued that no phrase-structure grammar will be adequate for giving a full grammatical description of sentences in English. Their arguments, however, have been based on a very particular definition of phrase-structure grammar which greatly restricts the amount of information supplied by such a grammar. In this paper, it is argued that there is no reason to place these restrictions on the notion of phrase-structure grammar and that, if Chomsky's conception is

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SERVE THE BUSINESS COMMUNITY

The Department of Commerce maintains Field Offices to enable the business community to avail itself locally of Government facilities designed to promote commerce. Working closely with various units in the Department and, when necessary, with other Government agencies, the Field Offices provide business services to manufacturers, wholesalers, retailers, trade publications, trade associations, advertising agencies, research groups, financial institutions, and exporters and importers.

Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field Offices act as official sales agents of the Superintendent of Documents, and maintain an extensive business reference library containing periodicals, directories, publications and reports from official as well as private sources.

Among the many services which businessmen have found of value are:

GENERAL

- Management and business aids
- Establishing a new business

BASIC ECONOMIC DATA

- Census data with national and often State and regional breakdowns, on manufacturing wholesaling, retailing, service industries, employment and unemployment, population, housing, agriculture
- Basic records of national income and product, regional trends, balance of payments, foreign aid

MARKETING AND DISTRIBUTION

- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

PRODUCTION

- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
- Commodity standards

FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

COOPERATIVE OFFICES

To make the services of the Department of Commerce more widely available, agreements have been entered into with more than 750 Chambers of Commerce, Manufacturers Associations, and similar business groups under which these organizations have become official Cooperative Offices of the Department. If specific information is not on hand in the Cooperative Office, your problem will be referred to the nearest Departmental field office.

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